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Marketing of Slab Zinc and Zinc Concentrates

By Felix Edgar Wormser

Interconnection of Contiguous Mines

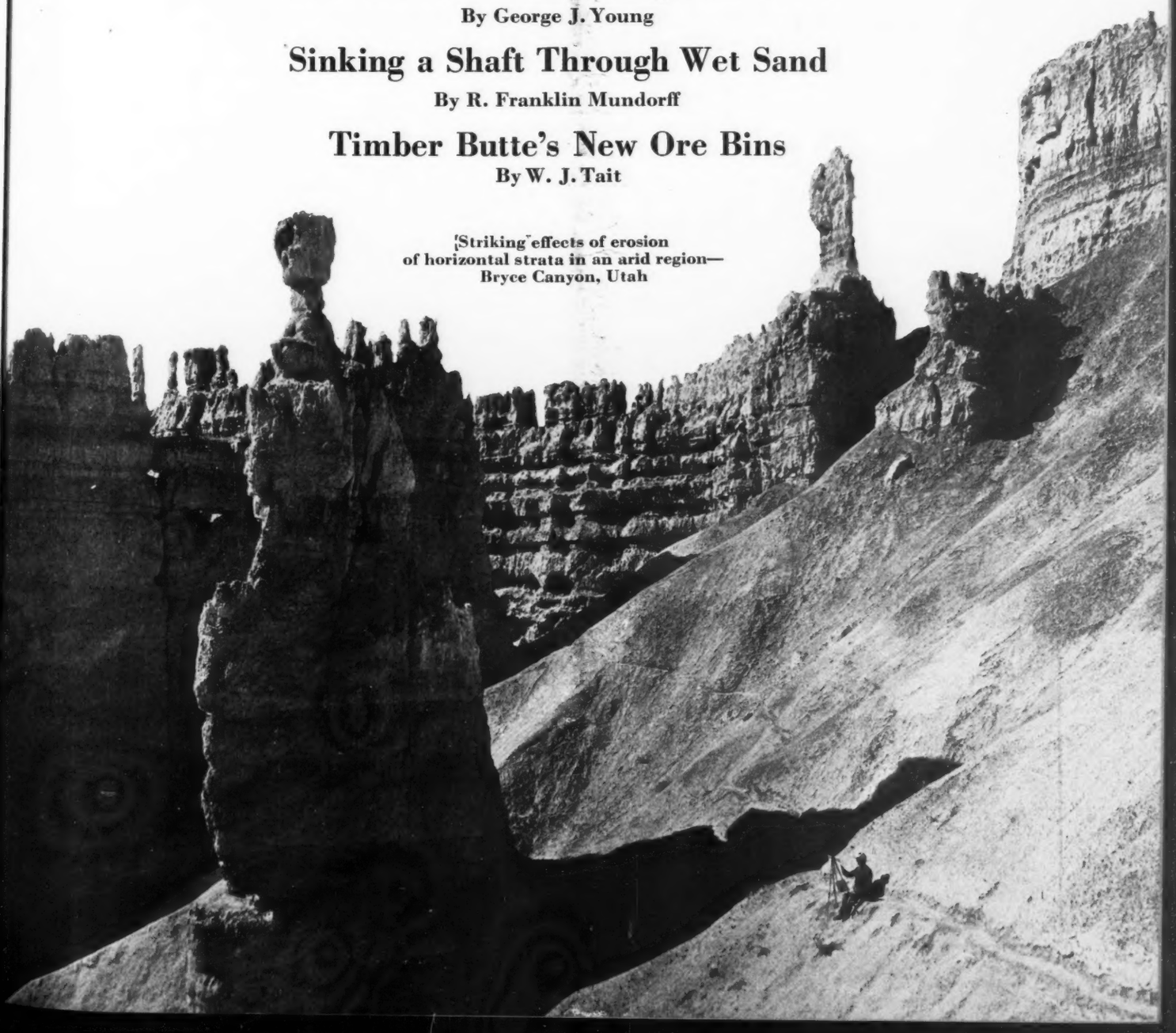
By George J. Young

Sinking a Shaft Through Wet Sand

By R. Franklin Mundorff

Timber Butte's New Ore Bins

By W. J. Tait



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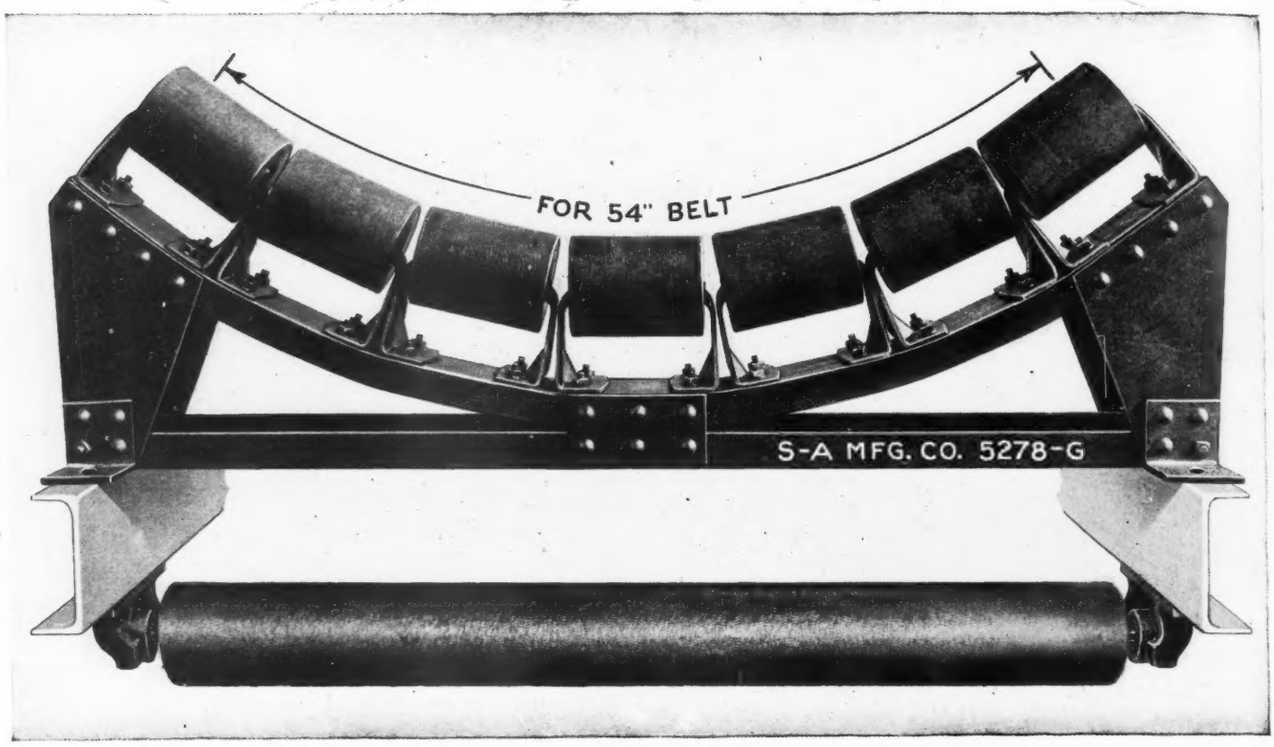

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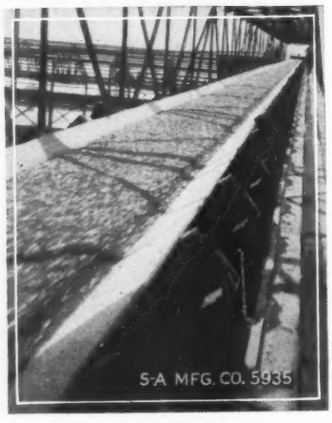

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ENGINEERING & MINING
JOURNAL-PRESS
JOSIAH EDWARD SPURR, Editor

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Anaconda Shuts Down Three Mines

THE ACTION of the Anaconda company in shutting down three of its nine active copper mines in Butte is logical from every point of view. From the standpoint of the operating officials in Montana it will help the labor situation and will permit lower per-ton-of-ore costs. A shortage of good miners still exists; the distribution of 500 men among the other mines in the district will automatically have the effect of increasing the individual efficiency of the underground workers. Another source of saving will be the release of perhaps seventy-five foremen, shift bosses, hoistmen, blacksmiths, and such men who do not directly swell the tonnage produced. Our understanding is that the output of copper will not be decreased one-third by curtailment; the remaining mines will produce more than they have done recently.

Looked at from the broader financial aspect, the shutdown is no less easily explained. At the current market for copper, production costs exceed the selling price. The problem is to determine the rate of output that will make the loss the minimum, bearing in mind the fact that the mines and reduction plants must be kept going and in good condition and that the operating organization must be maintained. Another factor, of course, is the adjustment of the output to be maintained by Chile Copper and by other Anaconda subsidiaries in the light of the requirements of its own manufacturing and fabricating plants. We surmise that the most desirable rate of production in Montana for the immediate future was determined, and that the officials at Butte thereupon decided that the most efficient way to make that production was to shut down the three mines.

A correspondent, commenting recently in our discussion columns on the shutting down of Anaconda's neighbor, North Butte, asked whether that was "the beginning of the end" and "if many others are likely to follow." To the first the answer is an emphatic no. To the second, no—though perhaps not quite so emphatic. There is no use dodging facts; with prevailing wages and cost of supplies the copper-mining industry in the United States as a whole cannot thrive on a 13½c. market.

Within the Law

SOMEONE SHOULD WRITE a book on the ethics of mine promotion—if only to nail down the fact that ethics still exist outside of the pulpit and the Sabbath somnolence. Mine promotion is legitimate and necessary, and a promoter is entitled to a profit. Capital must be found to invest in mines. Yet all these things should be governed by the firm hand of honesty and the will not to do your neighbor, as you would not gladly have him do you. Thus we easily distinguish between the two schools of promoters—those who intend to mine the ore and those whose energies are bent on mining the public. The latter class—it is trite to repeat it, but astonishingly necessary—are fundamentally dishonest; indeed, their best claim, in many cases, is that what they do is strictly legal. It is within the law.

One of the sins of mining promotion is extravagant literature. Investment or even speculation is a cold-blooded affair—a matter of the judgment. Promotion literature that appeals to the emotions—to enthusiasm and greed—is invariably the sign of the fool or the rascal, or both. Another cardinal sin is that of ignorance—ignorance of mining. This is often urged in exculpation of the smooth promoter. It is not an excuse; it is a convincing indictment. If these men are within the law, it is a pity; the law should be made a little stricter. The fool (who hides behind his mask of innocence) should not be allowed to decoy investors.

The honest promoter of mining must know the mining business or employ and rely upon competent and cold-blooded engineers that do. When you see a promoter dodging the matter-of-fact engineer and his judgment, you need no further proof of the ultimate intentions of such a man. But the honest promoter will bring out nothing that will not measure up to mining engineering standards as an investment or speculation, and he will set forth the proposition in the same terms as the engineer puts it up to him. He will not harvest the dollars of the poor and the stupid, but he will gain the confidence of men of like caliber as himself, and find no lack of financial support if he has anything real to offer.

The Value of a "Contact"

THE PROSPECTOR and miner has long clearly sensed the affinity of igneous intrusions to ore deposits, however much some schools of economic geology have blindfolded themselves to the facts. And the prospector and miner have used these conclusions in their work, with excellent results.

So far, so good; but all good ideas are apt to be ridden to death. The extravagant conclusion has been often reached that all igneous contacts are places where ore should be found; hence igneous contacts as such have often been prospected. This was the practical vagary; the theoretical vagary, believed in, until lately, by many if not by most geologists, was that the ore was pressed out from, or escaped from, the cooling igneous rock. This theoretical extravagance indeed justified the practical vagary noted; the trouble with it is that it is not true. There are many hundreds of thousands of miles of igneous contacts guiltless of even a suspicion of ore. The ore has not escaped from the cooling igneous rock.

When it comes to relatively narrow dikes, which are often associated with veins and other forms of ore deposit, the old belief becomes so evidently false that it should have disappeared of its own weight long ago; for by this belief there should be a more or less direct ratio between the mass of the parent intrusion and the

mass of the expelled ores; but anyone with practical experience, after a moment's reflection, will concede that there is none. The dike cannot have been the source of the associated vein. Indeed, where such an association occurs, the vein usually follows only one wall of the dike; there need be no vein on the other side of the dike, as there would be had the ore emanated from the dike magma.

The reason for the common association of dike and vein, or of intrusive rock in general, and ore deposits, is that both are forms of crystallized magma; both are derived from a common deeper source or locus of magmation. This is the genetic reason: there is in addition the physical or mechanical reason, in that both dikes and veins ascend by preference along cracks or fissures, which always remain lines of weakness. Hence a dike injection along a fissure may be and is often followed by a vein injection along the same place of weakness; and sometimes conversely a vein injection is followed by a dike injection along the same fissure. The former is the usual succession, since rock-magma temperature is higher than ore-magma temperature.

The practical lesson from these facts is that in prospecting and mining one should follow ore, not (primarily) contacts or dikes: the wise, old-fashioned miner's precept holds good—follow your ore. The geologist can help greatly with the study of associated rock formations, but these associations must be given their due weight, and no more.

Petroleum and Earthquakes

THE PERSISTENT OPTIMIST, who searches for the somewhere good that the ill wind blows, will find comfort in certain views of Dr. J. M. McFarlane, a professor of the University of Pennsylvania, concerning the Japanese earthquake—as reported in the daily press at least. Ten combined New York newspapers—combined on account of a strike—transmit what they call "a statement given out by the university." Dr. McFarlane believes that fish is the chief source of petroleum—that petroleum is fossil fish oil, in short—a view, unless we mistake, not so startlingly new. But the connection between fish oil and earthquakes is perhaps more novel. Dr. McFarlane "traces the origin of petroleum deposits to earthquakes and similar volcanic disturbances, which in early times killed immense quantities of fish." "Every new disturbance," the report states, "like the recent Japanese earthquake, particularly in regions adjoining the sea, results in the development of new deposits for the production of oil. This is Dr. McFarlane's answer to those who worry about the exhaustion of coal as a source of heat."

Whether petroleum be vegetable oil, as we believe is most commonly thought, or fish oil, as Dr. McFarlane and others think, or both, as still others believe, or whether it be inorganic and a volcanic emanation, as now and then an author believes: it is certain that Dr. McFarlane should not have tried to tie his belief up to the Japanese disaster.

Uniformitarian by education, we have nevertheless come to believe in a varying relativity of speed of geologic events, and that the speed at times amounts to catastrophism; but we cannot accept as indicated the catastrophic foundation of petroleum deposits. Dr. McFarlane's assumption is apparently that unless fish are violently killed they are immortal, and will live forever. Doubtless volcanic eruptions and earthquakes do kill fish, but these same fish would die in a year or two anyway: in a geologic sense it makes no difference—indeed the secular accumulations of dead fish without the earthquakes should be more than with them, for the violent death affects the parents, and if widespread would tend to decimate the supply of fish and fish oil.

Dr. McFarlane's conceptions of geologic times, if reported correctly, are not up to the standard, evidently, of his ichthyological erudition. This year's crop of fish oil from fish remains entombed in the littoral muds, and last year's, and the crop of the last thousand and hundred thousand years, is of no interest, from the petroleum standpoint, to us, or to our children's children, or to our descendants a hundred thousand years hence. Some millions of years from now the crop stands a bare chance—not much—of being reaped. So that "Dr. McFarlane's answer to those who worry about the exhaustion of coal as a source of heat" is not a knock-out. "Better fifty years of Europe," sang the poet ('twas before the European war) "than a cycle of Cathay." Better a ton of Pennsylvania anthracite this winter than the hope of a thousand-barrel oil well twenty million years from date, where now surges the Sea of Japan.

The newspaper report says, "According to the statement, Dr. McFarlane, in reaching his conclusion, emphasizes these points:

"That a knowledge of this fact will enable man to locate with almost scientific accuracy new oil deposits;

"That there is no danger of the exhaustion of the world's oil supply."

It is difficult to believe that any university, or indeed any university professor, actually gave out any such ignorant rubbish.

Opposing Civil Rights

THOUGH the coal strike has been temporarily settled the dilemma of opposing civil rights remains. Owners claim the legal right to operate their properties as they see fit and the workers that of organizing for collective bargaining, and both sides have shown themselves ready to go to any lengths to maintain those rights and reluctant to submit to arbitration. So the public pays. The problem of this conflict is an old one. Its solution will be a great achievement.

The Coal Commission has analyzed it in a recent report with especial reference to the Herrin massacre. The commission tells what happened then, describes the conditions that led to the atrocity, and attempts to explain the community's frame of mind that lets those responsible go unpunished. It declines, however, to fix the responsibility and uses many phrases such as "all justice is human and fallible," so much so that after one has waded through the many thousand words that this report alone contains he is as much up in the air as ever as to what he may conclude.

Employers and employees are within their legal rights, the commission holds, in demanding their respective privileges of running their business as they see fit and in organizing for collective bargaining. Each side admits the other's privilege, it says, but wants peace only by suppressing the other—by "killing the other fellow's principle." The commission lays the unwillingness to arbitrate to the lack of a suitable "yardstick" by which arbitrators may be unqualifiedly required to measure the facts. It therefore suggests certain principles which may serve arbitrators as a yardstick in the future. "In this clash of right," it says, "every red-

blooded American in the industry will yield as much as is necessary of his unqualified legal right."

The report is interesting, especially the sensational account of the Herrin tragedy. But it gets nowhere. The solution of the problem of opposing civil rights seems brought no nearer by this dissertation and by the "yardstick" proposed. Voluntary arbitration, and not compulsory, is desirable, says the report, but who or what can make the opposing sides submit to any kind of arbitration, yardstick or no yardstick? Public opinion, says the report. Public opinion would probably recommend a nightstick rather than a yardstick, but even this would bring no result. The report is at its worst when it says that "outraged public sentiment will furnish a coal supply either by the army or by the penitentiary." The army cannot produce a supply of coal here any more than French soldiers have produced it in the Ruhr—and can an entire populace be jailed? The government may fix the price of coal and supervise its production, but it cannot make the miners work.

Patience in reading this report brings no reward. It offers no solution. Education seems the only solution that will endure, and it will be a long process. Not until employer and employee come to realize that it will be most profitable for them to settle all differences amicably will industrial disorder disappear.

A Rose by Any Other Name—

"OFF AND ON I have been scratching my head [figuratively, we trust] ever since I read the news item in your issue of Sept. 8 regarding the Canadian mine promoters who are going to sell shares and give a trust company's bond for the return of the investor's money in fifteen years with 3 per cent compound interest. I have never seen a promoter in business for his health. How can he make any money on this deal? Please elucidate," writes a friend.

On the face of it this does seem rather puzzling. The explanation comes with a study of that amazing little truth teller, the compound interest table. Suppose Citizen A invests $10,000 in the mine of Promoter B. He gets a bond from Trust Company C that undertakes to pay him $15,579 fifteen years from now. This is what $10,000 at 3 per cent compound interest will amount to at the end of a fifteen-year period. But if B deposits with C $7,494 today, agreeing to leave that sum with him for fifteen years, C will be glad to allow him 5 per cent compound interest. And $7,494 at 5 per cent will amount to $15,579 in fifteen years. That leaves $2,506 with which B may pay his own commission, or machinery-house bills, or miners' wages, or whatever else needs to be paid to develop the mine. Of course A has his shares of stock and will participate in the profits—if there are any.

As a matter of fact A might better invest his $2,506 in stock and go out and buy high-grade first mortgage bonds with the $7,494; he can get 5½ per cent paid quarterly with virtually no risk at all.

The theory of our friends up in Canada is that they can sell shares at par instead of at a generous discount by coupling the trust-company guarantee. We have no desire to throw cold water on the plan, but we are inclined to believe that it will take just as much high-powered and high-priced salesmanship to sell $40,000 worth of stock on the proposed basis as to sell $10,000 worth as a straight out-and-out speculation.

Mining and the Spread of the Gospel

THE PROMOTION of Christian work and the founding of missions and stations for "preaching the Word," using for this purpose part of the profits anticipated as the result of mining operations, was given as one of the objects of incorporation of a company recently. The articles state that "The enterprise of the company shall be established and maintained upon a sound business basis, and we [the directors] agree to devote the yield of the mines of the company to Christian work as fully and as steadily as possible."

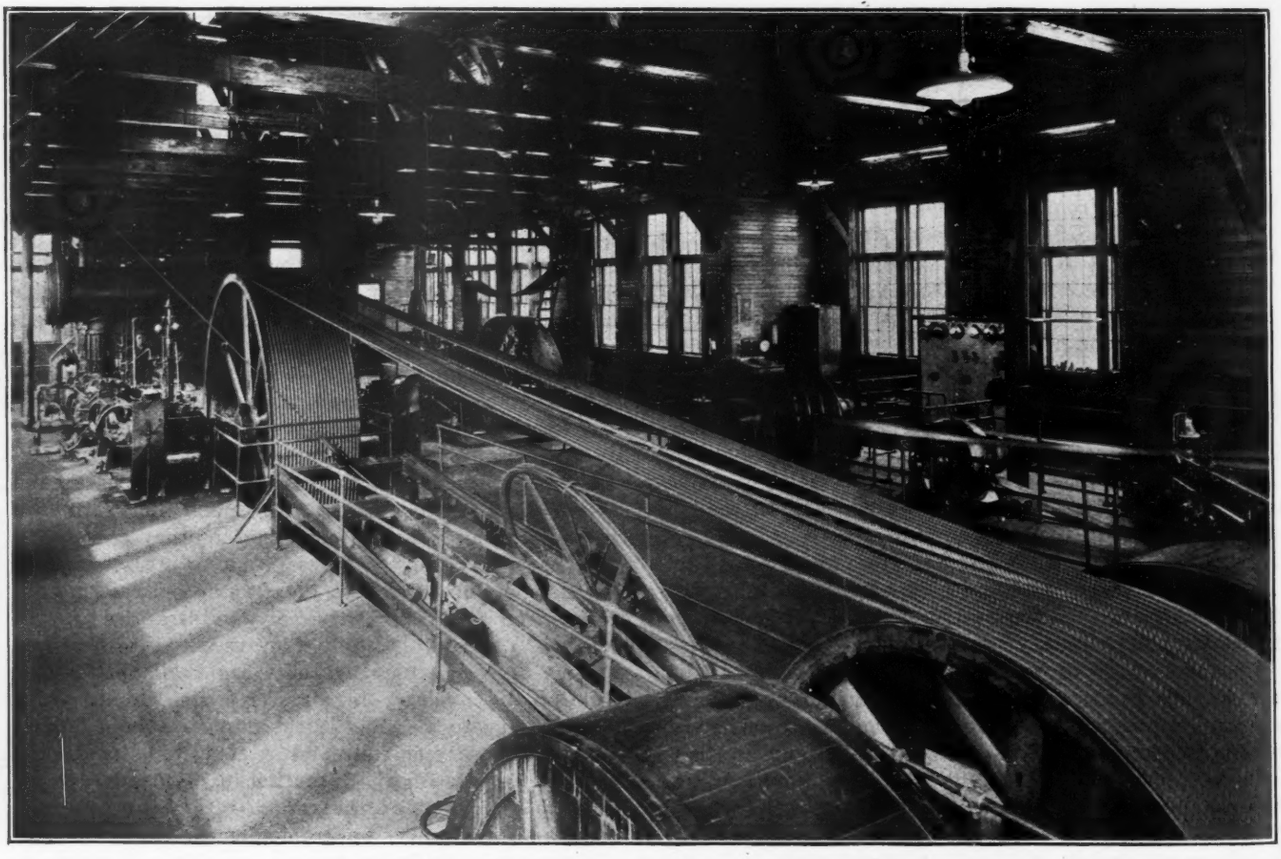
As investments go in these times, however, it would appear that the advertised piety of the promoters is not likely to cause financial embarrassment to the stockholders. The urge to sacrifice earnings to further the spread of the Gospel apparently is not felt until the company's net profit reaches $100 per day, which is equivalent per annum to over 18 per cent of the stock of the concern. When this stage of prosperity is reached, 10 per cent of the net profits are to be diverted for religious purposes, leaving the stockholders with an income of slightly over 16 per cent on their investment. A sliding scale of disbursement for missionary purposes is proposed in the event of increased income, whereby 50 per cent of the net profits will be used thus when these reach $500 per day. This means that the company would be earning a net income of $182,500 per annum, equivalent to over 90 per cent of the capitalization. If the directors part with 50 per cent of this, dividends of 45 per cent will still be distributable to stockholders.

The mixing of religion and business is seldom successful. In the present instance the suspicion is created that the articles of incorporation are intended to serve as an appeal to the religious minded, who may thereupon be inclined to subscribe more liberally to ventures of this character. An analysis of holdings in mining companies often shows that ministers of religion and others earning small incomes in religious work provide an appreciable proportion of the working capital. The conclusion that the action under review has been taken for the purpose of currying favor among those of religious tendencies is inescapable, and we question the right of directors of any company to divert profits to further the spread of the Gospel, however laudable such action may be. There are many groups of thinkers among stockholders, each of whom has specific views as to how the money should be spent to secure the best results—views that are radically different from those held by most if not all of the others. Further, the articles assume that recipients of dividends do not set aside the customary tithe for religious purposes; and stockholders would prefer to respond in their own fashion to whatever religious emotions they possess.

If the purpose of the move is not to attract capital, why the publicity given to the assumed altruistic generosity and moral initiative of the directors of the company? Moreover, surely, it were better to postpone mention of the gift until profits are available for distribution, or at least in sight. When the directors "agree to devote the yield of the mines of the company to Christian work as fully and as steadily as possible," and then provide for the retention of dividends equivalent to 45 per cent of the capitalization in the event of unusual prosperity, we are confirmed in the opinion as to the impossibility of mixing religion and business.

The Smelter at Trail, B. C.

Birds-eye view of smelter of Consolidated Mining & Smelting Co. of Canada, Trail, B. C.



Interior of compressor building at Trail smelter

Mining in British Columbia

By T. A. Rickard

THE record of mineral production in British Columbia for 1922 showed some improvement over that of the previous year, which was the worst since 1914, the first year of the war, when mining was crippled for reasons that need no explanation. The prospects for the current year are good. The total production in 1922 was $35,158,843, as against $28,066,641 in 1921. Of this total, the collieries were responsible for 2,511,843 long tons of coal, valued at $12,559,215, to which must be added the 45,835 tons of coke, worth $320,845.

The output of metals in 1922 was worth $19,596,657, as against $13,153,598 in 1921. The yield of placer gold, which was worth $3,913,563 in 1863—sixty years ago—has dwindled to an inconsiderable figure, having been only $364,800 last year, and $233,200 in the previous year. The first placer gold was won in 1858, on the lower Fraser River; this led, two years later, to the discovery of the rich alluvial deposits of the Cariboo district, which has yielded $50,000,000 in gold, and was a prime factor in attracting attention to the mineral resources of British Columbia. The increase of 56 per cent in the total output of placer gold last year is to be credited chiefly to an increase of activity on Cedar Creek, a small stream flowing into Quesnel Lake, in the Cariboo district. These operations were loudly heralded in the daily press, but proved disappointing, as compared with the first reports.

The lode mines of the province produced $19,231,857 in 1922, as compared with $12,920,398 in 1921, and $31,483,014 in 1916, when the high prices of the base metals, consequent upon the manufacture of munitions of war, gave an extraordinary stimulus to production. The yield of the precious metals from lodes in 1922 was more than doubled, that of gold being $4,089,684, as against $2,804,154 in 1921, and the output of silver $4,554,781, as against $1,591,201 in 1922. These increases are attributable entirely to the successful development of the Premier and other mines in the Salmon River district of the Portland Canal division, which contributed $2,553,303 in gold and $2,735,076 in silver. The Premier produced 123,527 oz. of gold and 4,261,368 oz. of silver from 102,334 tons of ore. Another big gold mine is the Surf Inlet, controlled by the Tonopah Belmont company, which yielded 35,015 oz. of gold and 697,058 lb. of copper. Another notable increase in silver production is shown by the Slocan division in the Kootenay region, the output being 1,104,628 oz., as against only 188,142 oz. in 1921. This increase is to be credited to the Silversmith mine (or Slocan Star), at Sandon, which is one of the earliest and steadiest producers in the district. The ore is concentrated by flotation, yielding two products, one rich in lead, the other rich in zinc, and both carrying the silver of the crude ore.

Last year the production of copper was very low—no better than in the abysmal year that preceded—for it was only 32,359,896 lb., as against 65,379,364 lb. in 1916, during the war, and 46,460,305 lb. in 1913, before the war. Of the 1922 copper output, no less than 97 per cent came from the Hidden Creek mines of the Granby Consolidated company at Anyox, on Alice Arm, a branch of the Portland Canal. The only other noteworthy producers of copper in 1922 were the Surf Inlet, Le Roi (at Rossland), and Indian Chief (on the west coast of Vancouver Island) mines. The second largest copper mine in the Province—the Britannia—was non-productive in 1922, on account of the destruction of the mill by fire in 1920, and the disastrous effects of a flood, which washed out the lower settlement and caused the loss of thirty-six lives. A new mill has been built, and started to work in May. The Britannia is expected to produce 30,000,000 lb. of copper during the current year. Since 1919 the copper mines at Phoenix, belonging to the Granby Consolidated company, have been idle. In 1918 the copper production of the Boundary district was 9,940,125 lb.; last year it was nil.

The total lead production last year was 67,447,985 lb., as against 41,402,288 in 1921. The output of this metal was the highest on record, the next best figure being 56,737,651 in 1919. This favorable result was due to the splendid development of the Sullivan mine, of the Consolidated Mining & Smelting Co., of Canada, which operates the big smelter at Trail. The Sullivan is at Kimberley, in the Fort Steele Division; it is, as most of my readers know, one of the great mines of the world. The new concentrator, of 2,000 tons' capacity, has just been started. Of the lead output of the province last year, 85 per cent came from the Sullivan, which produced 360,845 tons, yielding 956,028 oz. of silver, 57,743,931 lb. of lead, and 51,672,816 lb. of zinc. It produced a little more than 90 per cent of all the zinc mined in the province, the grand total being 57,146,548 lb., as against 49,419,372 lb. in 1921. The Slocan district contributed 7,633,624 lb. of lead and 5,164,661 lb. of zinc, the products chiefly of the Silversmith, Bosun, Standard, and Rambler-Cariboo mines. The old lead mines of the Ainsworth and Windermere districts, in the Kootenay country, produced only 1,640,000 lb. of lead.

In summarizing the statistics of metal production, it will be noted that 55 per cent of the money value of the total output last year came from the Northwestern district, thanks to the Premier and Hidden Creek mines, and 40 per cent was contributed by the Fort Steele district, thanks to the Sullivan mine. It is noteworthy that the West Kootenay and Boundary districts have lost their former eminence as the mining centres of the province. Except for the Sullivan mine, the trend of successful mining development is all toward the coastal region, along the fringes of the batholithic extrusion that marks the Coast range. The smelter at Trial continues to be a successful enterprise, but about 90 per cent of its supplies of ore comes from the Consolidated company's own mines, not from customers in the adjacent districts. Grand Forks is dead; Rossland is sleeping, until a mill is available for concentrating the low-grade ore that remains in the old mines. Of the big mining operations, all except those of the Consolidated Mining & Smelting Co. are controlled by American capital. Even the Granby Consolidated, which started as a Canadian enterprise, is now directed from the United States. However, I hasten to say that the best of good feeling exists between the American operators and their Canadian friends, and either American initiative or American capital is welcomed heartily in the province.

Ruby Mining Thrives in Burma

Natives Pay Company for Privilege but Market Own Gems—Ruby Mines, Ltd., Has Concession

By E. W. Slater

THE development of the ruby mines in the Mogok district is one of the interesting features of mining in Burma. The rubies rank among the finest in the world. For many years before the British took control of the district, extensive mining had been carried on by the people of the country, but the advent of modern machinery and methods has greatly changed conditions.

The old methods of mining consisted of digging a round hole little wider than would admit an ordinary-sized man. The soil was excavated to a depth of 50 or 60 ft. if the vein seemed promising, the sides being timbered if necessary. The discovery of a few valuable gems was an ample reward to the small company at work in such a mine. Another method was the use of water for placering on the sides of the hill.

Under modern conditions, though it must be borne in mind that a great deal of work is still done by native methods, the mining is more elaborate and more productive. The Ruby Mines Co., Ltd., which has the concession from the government for working this area, has a force of specialists engaged in mining and preparing the rubies for the market. These men act as chemists, drillers, lapidaries, and overseers. The actual work is, of course, done by the natives of the district.

Sluice-box operations recover most of the gems. The hillsides are constantly saturated with water, and the earth, when loosened, is dug up and taken away in cars to the sorting sheds. Here it is washed in streams of water, and the precious gems are carefully picked out.

The value of the rubies and sapphires obtained in these mines varies from year to year. The best year was 1907, when the value of the output was over £110,000; the worst, 1908, when it was little over £50,000.

The government introduced new rules in 1897, when the concession for mining this area was given. The rights of the native miners have been carefully defined, and it would appear that all parties are satisfied with the agreements that have been reached. The natives still carry on their mining, paying to the company 20 rupees (about $7) per month for each workman employed. He is now able to dispose of his finds as he wishes, whereas in the past it was insisted that all were offered to the company. For the privilege of working this area the company pays the government the sum of £200,000 a year, plus a percentage on the native mining royalties and on net profits.

Before the beginning of operations by the Ruby Mines Co., Ltd., there was no public ruby mart. Each trader bought and sold in his own house or in the neighboring villages. Now there is an association of Burmese diamond and ruby merchants with its headquarters in Mandalay, and this plays an important part in the trade.

The search for the rubies takes place in a circular flowing pool where the gravel containing them has been washed down from the hillsides. It happens sometimes, keen though the searchers are, that small gems are washed from this pond into the lower ponds to which the water passes. According to an old custom, the women of a certain caste are permitted to search for these, and they are allowed to retain possession of whatever is found.

The precious stones are cut and polished at Mogok. Some of the native workers are exceedingly clever, and they have adopted new forms, as the rosette, the trap-cut, the step-cut, to meet the demands of the market. The stone is fixed at the end of a pointed instrument, in a composition of chalk, resin, and wax, and ground on a wooden slab. On this slab is placed a mixture of shellac and pounded sapphire dust, and by rubbing on this the required degree of smoothness is attained. It is finally polished on a revolving copper plate.

Pack Train with Ore for Smelter Crossing Ixtlan River, Nayarit, Mexico

Photo by Henry Mace Payne

Each mule carries 150 kilos in sacks, each sack being sealed, tagged and numbered

Concrete Caisson Used to Sink Shaft Through Wet Sand

Work Done in Half-hour Shifts Under 50-Lb. Pressure—Sealing at Bedrock Important Feature

By R. Franklin Mundorff
1108 Askew Avenue, Kansas City, Mo.

FOR MANY YEARS the Grasselli Chemical Co. had entertained hopes of opening up a seam of coal underlying its property near Terre Haute, Ind. The conditions were unusual and required much study. Bore-hole records showed that at the proposed location of one shaft there was an overburden of 140 ft. of sand and gravel, of which 111 ft. was water-bearing, and that the rock at a second site was 160 ft. below the surface, 105 ft. of the overburden being wet.

Hydrographs of the Wabash River were studied, the hydraulic gradients at various stages were plotted. and data on the water conditions and the possibility of lowering the water were considered. Records of shaft-sinking methods previously employed in the vicinity were investigated, but most of these were of no suggestive value, inasmuch as the surface conditions were quite different and no serious difficulties were encountered in carrying the shafts to the rock.

Generally, the shafts had been sunk and timbered. Little or no trouble was experienced with water and running sand, and in several instances where conditions were unfavorable to this open method, steel jacking plates, followed by skin-to-skin timber sets, had been employed. Many of these undertakings, however, were failures, and in only a few of them did a plumb shaft result. It was impossible at all of the mines to shut off the water at the rock, and it was evident—considering the condition of the timber lining of some and wondering at the flexibility of a cage that could follow such crooked guides—that there would have to be an improvement in the job over the old timber method. It was decided that a pneumatic caisson would carry through the 160 ft. of sand and gravel, and that it could be successfully sealed to the rock bottom despite the 51 lb. pressure required in the working chamber to overcome the hydrostatic head at this depth.

The auxiliary shaft, for carrying men and materials, was to be 13 ft. 6 in. inside diameter, with an 18-in. thickness of concrete lining in rock. It was decided that 16 ft., leaving a clearance of 1 ft. 3 in. all around, would be sufficient to overcome the irregularities in sinking and the possibility of the caisson being slightly out of plumb when landing on the rock. The design of the caisson was left entirely with the contractor. The walls were 4 ft. thick, making the outside diameter of this shell 24 ft. The caisson was reinforced with steel rods horizontally and vertically, and fitted with lubricating pipes set in the concrete at intervals of 20 ft., to provide, at eight points in its periphery, means of lubricating the outside surface with water, steam, or air forced through under pressure from the top of the shell. These pipes were much used in sinking, and, at times, when the shell became a little tight, were invaluable in reducing the skin friction which held it, and also insured an even motion downward, with the cutting edge occasionally crowding the digging.

The cutting edge was made of heavy steel angles and plates, securely anchored to the concrete. The concrete forms were made in collapsible steel segments and came in 8-ft. vertical sections with four segments to the ring. This shaft was provided with three inside and two outside rings complete. Steel forms were used in building

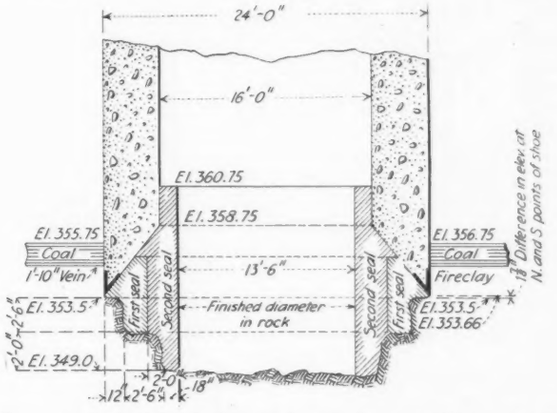


Fig. 1—Details of the seal for the auxiliary shaft

the caisson, which was of concrete. As work progressed, dirt and rock were blasted out and removed with an orange-peel bucket, compressed air being used to exclude the water.

Shoes of bent plate-steel construction extended around

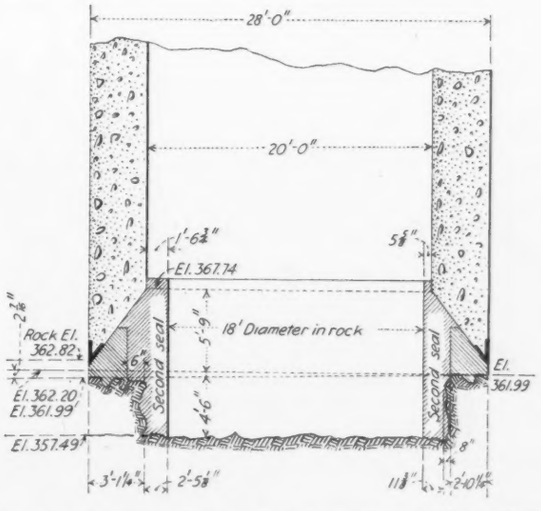


Fig. 2—Details of the seal for the hoisting shaft

the entire perimeter of the shaft. At the auxiliary shaft, the shoe was 24 ft. in diameter. It was made up of an outside plate 24 ft. long by ½ in. thick. This was reinforced at its lower edge by 9 ft. by ⅝ in. plate. On the inner side of this intermediate plate was riveted

the bent plate which followed the inside line of the working chamber. The bent plate was about 22 ft. long and was held in place at 4-ft. intervals by struts which were made up of a base plate 6 ft. by ½ in. by 1 ft. 1 in.

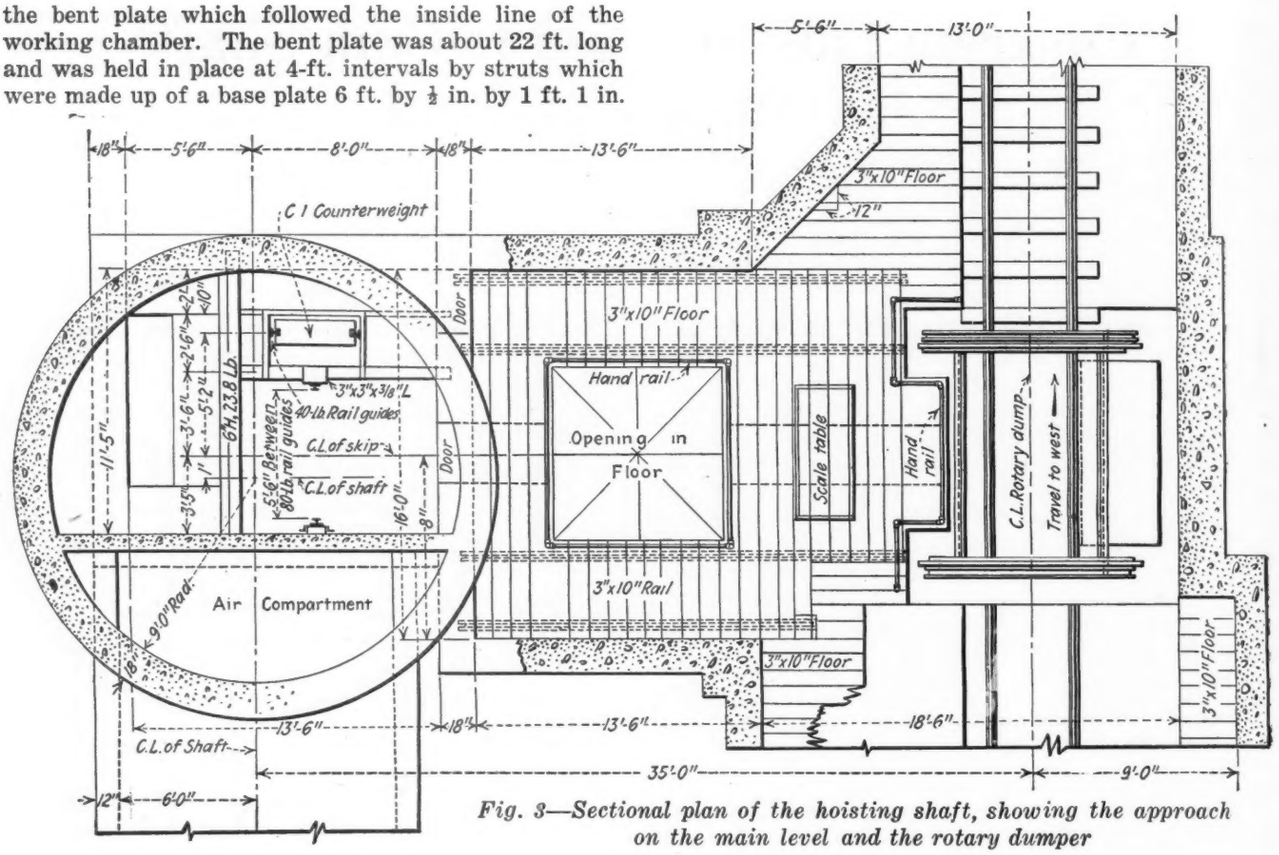


Fig. 3—Sectional plan of the hoisting shaft, showing the approach on the main level and the rotary dumper

long, and ⅜-in. angles 3 by 3 in. In assembly, the several shoe sections were riveted together, forming a cutting edge 24 ft. in diameter, and the anchor rods, which alternately extended from inside and outside plates into the concrete, were riveted in place. With the shoe set and leveled up, the first 8-ft. outside form was placed, and the form for the working chamber, which was 6 ft. in height, was built, and the corresponding 8-ft. inside form placed.

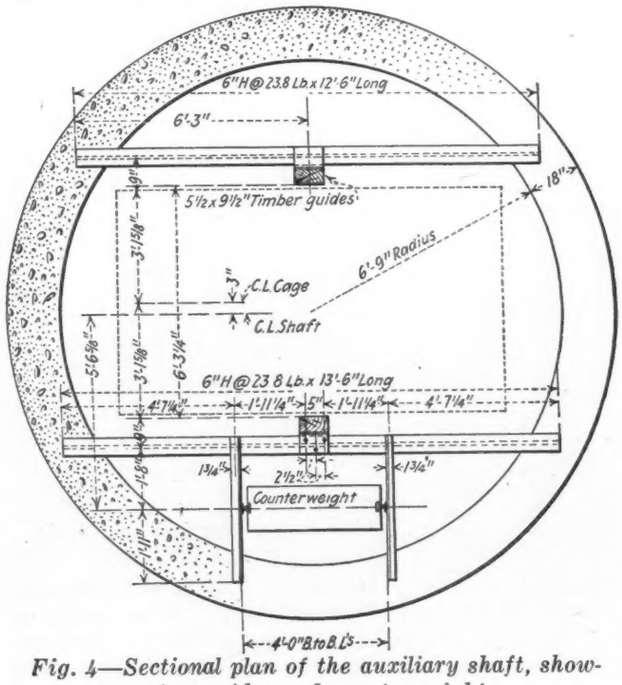


Fig. 4—Sectional plan of the auxiliary shaft, showing guides and counterweight

The shoe was set and riveted, and the first 8 ft. of concrete was poured. After setting about five days the excavation was made within the shell, and the entire mass was allowed to sink until ready for the second lift of concrete. The entire caisson was poured in successive 8-ft. lifts and placed as the excavation progressed.

The shoe struck water at a depth of 25 ft., and when the point had submerged 33 ft., the concrete deck was put in, 35 ft. above the shoe, and preparations were made for air. The concrete decks for pneumatic work were of heavily reinforced concrete of plate-girder construction, and were constructed to bear a pressure of 75 lb. per square inch.

At 58 ft. below the surface three eight-hour shifts were put in the hole under 16-lb. air pressure. The material at this depth was entirely sand and gravel, and 6-in. blow pipes were used to remove practically all of it. If the caisson showed a tendency to stick, the lubricating pipes were brought into play, and the skin friction was thus overcome.

The bouyant effect of the high-pressure air, and the lack of resistance of the fine sand immediately above the rock, made the caisson very unstable and hard to control. Just before it reached the rock it was badly out of plumb, and much time and labor were spent in efforts to land within the 15-in. allowance. Kickers were used on the low side at the surface; excavation was carried on at points diametrically opposite with the orange-peel bucket, and the caisson was relieved of earth pressure down to the water level, 25 ft. from the surface. Inside, a system of blocking was put under the shoe to retard the movement of the low side.

When the shoe landed on the coal seam just above the rock it was 10⅜ in. out of plumb. It was found that

the seam pitched 12 in. in the 24-ft. width of the chamber, with the high point of the coal, unfortunately, on the high side of the shell. The other side—after allowing for the difference in level of the shoe at the high and low sides—was, therefore, about 10⅛ in. from a solid bearing.

With the coal seam pitching in exactly the opposite direction from that desired, it was necessary to block up the 10-in. gap on the low side of the shoe down to the top of the coal and to undercut along the high side until it was practicable to drop the cutting edge to the coal with an even bearing throughout its entire length and with no material loss in its plumbness.

Below the 22-in. seam of coal occurred a stratum of fireclay, and it was in this impervious material that it had originally been planned finally to land the shoe and to seal the shaft. The removal of the coal was a slow operation, all of the material having to be "locked out" in buckets, and the shifts being changed every half hour, under pressure ranging from 49 to 51 lb. It was some time before it was possible to level up in the fireclay for the last caisson drop to the rock. The shell by this time was very light; it was blown unsuccessfully for more than a week before it finally let go, landing evenly at the point where the excavation had been squared up in the fireclay. With each blow down during this period there was a large influx of sand and water, in some cases as high as fifty buckets having to be cleaned up with each reduction of pressure.

Concrete Seal Poured Under Pressure

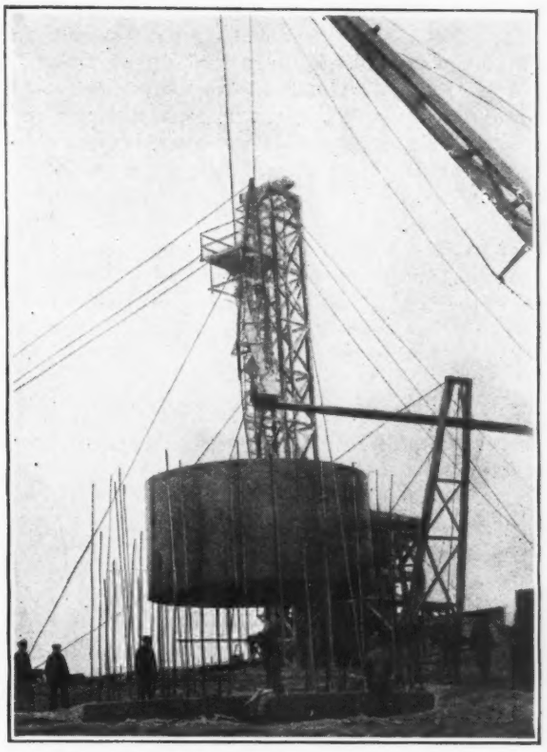
Calking the shoe was accomplished by using oakum and a very stiff grout. After carrying the excavation 2½ in. below the shoe, forms for the first half of the seal were placed, and the concrete was poured. A pressure of 51 lb. was maintained until the concrete had set sufficiently, and then the compressor was stopped and the pressure gradually cut down to normal. It was found that the hole made 13 gal. of water per minute, which it was believed the second seal would easily take care of. This shaft passed through:

Class of Work	Elevations	Feet
Dry excavation	491.1 to 466.1	25
Wet excavation	466.1 to 433.1	23
Pneumatic excavation	433.1 to 351	82.1

The water elevation at the time the seal was made was 466.65, giving the final hydrostatic head at 115.65 ft. with a theoretical pressure of 50½ lb. A matter of 51½ lb. was actually carried when the first half of the seal was made with the men on half-hour shifts. The air equipment was then removed, and "open" excavation for the second half of the seal was begun, carrying the bottom in solid rock 2 ft. below the level at which the first seal was made. The final closure was made with grout pipes taking care of the 13 gal. per minute leakage. The stop cocks on these pipes were later closed, and it was found that practically all of the water had been cut off. These holes were grouted and the job was complete.

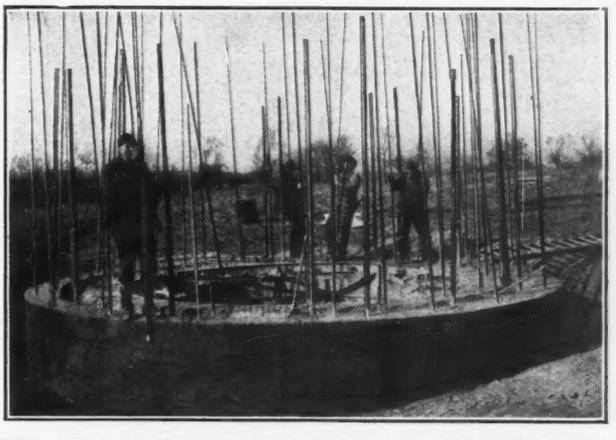
One Shaft at a Time

Under the schedule for the work, and because of the possibility of failure of the method adopted, it was decided to work on one shaft at a time, having the second one ready for air when the first was sealed on solid rock bottom. Accordingly, the main shaft, having a 20-ft. inside diameter, a 28-ft. outside diameter, and a 4-ft. thickness of shell, was not started until the first one was completed. With the shoe set and riveted, the first 8-ft. lift of concrete was poured. The cutting edge reached the water and the shell got down to elevation 428 ready for the deck. The steel girders and deck beams were placed and the concrete deck was poured. An additional form was placed on top of the shell and everything was then ready for the sandhogs. The air equipment was moved over from the auxiliary shaft and the caisson put under compressed air.



Lowering one of the steel forms preliminary to pouring the concrete

As in the case of the auxiliary shaft, most of the material was blown through 4-in. and 6-in. extra heavy pipe, and only a small percentage was sent out in buckets. The rock pitched slightly where the caisson landed, but being very hard sandstone it was simply necessary to square up and seal within 10 in. of the top. This caisson, with an area of 616 sq.ft. and with its deck



This view of the auxiliary shaft shows the eight lubricating pipes used in sinking the caisson, and the reinforcing rods

35 ft. from the shoe, was very unstable under high pressure. When the top leaned, the natural tendency of the caisson was to continue in that direction, and this had to be fought against all the way down to keep within the 12-in. allowance. The shoe, being in fine sand which offered no resistance, could not be reasoned with, and the use of kickers and blocking on the inside proved to be a decidedly false move. Along with this system of blocking in the working chamber there was carried outside on the low side a similar group of kickers. With each blow-down these were brought into play, and the top, which leaned 24 in., was thus brought back to 10 in. when the caisson landed on the rock.

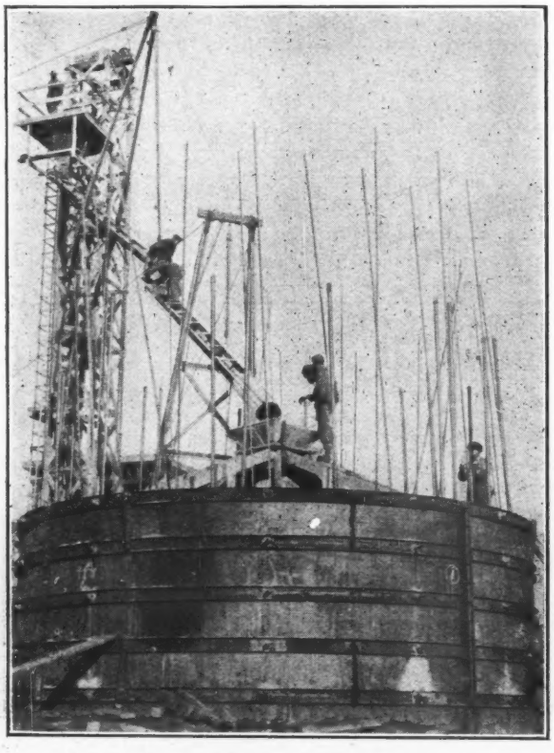
Seal Leaked Slightly

The cutting edge was caulked, the forms of the first seal were set, and the concrete was poured. When the compressor was stopped the leakage was found to be 2 gal. per minute. An examination of the elevations shows that at the time of sealing the shaft had passed through:

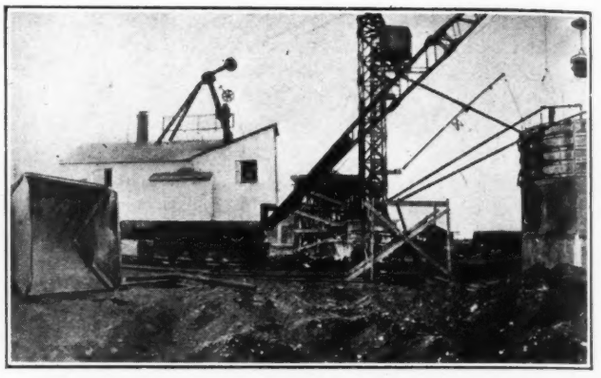
Class of Work	Elevations	Feet
Dry excavation	518.85 to 470.35	48.5
Wet excavation	470.35 to 428.10	42.25
Pneumatic excavation	428.10 to 361.99	66.11

The water elevation at the time of the seal was 466.77, with the river falling. The final hydrostatic head was 104.78 ft., with a theoretical pressure of 45.5 lb. About 47.5 lb. was carried in the chamber up to the day of the seal, when it was run up to 49 lb. while concrete was being poured.

Both the shafts are in the coal. The concrete tipple at the auxiliary shaft contains a cage and the main shaft is designed for a skip. The water in both shafts was practically shut off and with the final grouting was reduced to such a point as to make a pump on the bottom unnecessary.



The tower in the background made the pouring of the concrete efficient



Main or hoisting shaft in progress of construction

The job was done with steam power. The main power plant was at the auxiliary shaft, with a 4-in. line leading to the main shaft. The two openings were 1,600 ft. apart.

In concreting the "whirler" was used for filling the sand and gravel bins and in handling cement to the mixer; the tower and chutes transferred it to the shaft. The cost of the operation was remarkably low. The material that was passed through was mostly fine sand and gravel until just above the rock, when the gravel became a little coarse and it was not then possible to use the blowpipe. All the coarse material was sent out in buckets and the rest was blown.

Two shafts were sunk, as is common practice in the locality. One shaft serves for handling men and materials used in mining the coal; the other shaft is used for the handling of coal exclusively. The auxiliary shaft is also a means of escape in case of accident.

The first vein of coal, a 22-in. seam, was passed through before the shafts were sealed to the rock; therefore it is impossible to work that vein. The seam which will be mined is under the rock and is known as the No. 4 Indiana seam. At this location it is a little over 5-ft. thick, and is good clean coal. The shafts extend beyond the point where water seeps through.

Shaft Well Equipped

The coal is to be mined as in any ordinary double-entry mine of the room-and-panel type. The rooms are dug in the coal bed at the terminus of the shaft, and as the coal is removed the open spaces are timbered and the coal further back is removed.

The stairway at the main shaft is of steel. The spreaders are 6-in. H-beams, with 80-lb. rail guides carrying the skip, and 40-lb. rails for the counterweight.

At the bottom of the auxiliary shaft was the usual sump, extending about 10 ft. below the coal, and near by is a pump chamber with its sump. There were the usual arches for air inlet, which extended about 15 ft. into the coal.

At the main shaft, which was designed for a single skip, the bottom was carried about 50 ft. below the coal. It has the usual bin and rotary dumpers, with weigh pan and hoppers for shafts of this type.

The capacity of the mine is about 1,000 to 1,200 tons a day, and the single skip at the main shaft will handle the entire output of the mine.

The Dravo Contracting Co., of Pittsburgh, Pa., designed the caisson and planned the working methods.

Marketing of Slab Zinc and Zinc Concentrates

How One of the Most Important Non-Ferrous Metals Is Sold—
Special Practice Used in Buying Ores

By Felix Edgar Wormser
Assistant Editor

A typical zinc concentrator in the Middle West

SLAB ZINC is almost invariably sold by American smelting companies directly to consumers and is, therefore, no exception to the practice in the copper and lead markets. Brokers and middlemen occupy a subordinate position, and their part in the distribution of the metal to manufacturers is largely confined to the handling of zinc derived from scrap or secondary sources. Occasionally they are used by producers to sell a certain lot of zinc; in fact, much more so than in the copper and lead markets, but by far the largest part of zinc consumed in the United States is sold by direct negotiation between smelting or producing company and consumer.

Although facilities exist for the buying and selling of zinc on a metal exchange, the producing companies prefer to deal without that agency and do not avail themselves of the privilege.[1] In the absence of any organized market it may seem strange that the selling of zinc proceeds as smoothly as it does. The sales managers of the numerous zinc companies are always well informed about the state of the market and any changes in price that may be made by competitors. The telephone and telegraph are extremely important agencies in keeping them so well advised of actual market conditions. They rely upon conversations with consumers, definite bids and offerings made, refused, or accepted, published reports in trade periodicals, quotations of the London metal market, and upon the reports of fellow officials in touch with factors that might influence buying. It is remarkable how quickly the knowledge of any market change spreads, not only locally but internationally as well. Producers and consumers find great difficulty in keeping the details of any purchase confidential, and its terms generally leak out promptly or can be surmised with a surprising degree of accuracy.

Sales Made on an East St. Louis Basis

East St. Louis, Ill., is and has been for years the price-basing point for most of the zinc sold in the United States, and its position in the industry is due to close proximity to the most important zinc field in the country—the Missouri-Kansas-Oklahoma district. It is a convenient distributing point from which to base shipments of zinc to the principal manufacturing centers. However, the leading zinc-producing companies maintain their headquarters in New York, where sales are concluded with manufacturers or other consumers.

Although slab zinc may be sold on an East St. Louis basis, the metal may not necessarily be shipped through or from that city to consuming places. A zinc smelter may be situated several hundred miles distant from East St. Louis, and orders as they are obtained may be routed to destination without ever touching East St. Louis. The purchaser is charged the East St. Louis price plus freight to his plant from East St. Louis. The freight rate from a middle western zinc smelter (west of the Mississippi River) to the chief consuming cities is generally equal to the sum of the rates from smelter to East St. Louis and from East St. Louis to consuming city. Exceptions to this rule will be noted later.

The buyer of slab zinc is usually more particular about the brand of metal he purchases than the buyer of copper is about his selection, the reason being that the bulk of the slab zinc produced in the United States has been treated by fire methods which do not permit the close control of impurities afforded by the electrolytic process, so that slight differences may be found in the analyses of various brands of Prime western zinc.

A trend is noticeable in the most important zinc-producing countries in the direction of a larger produc-

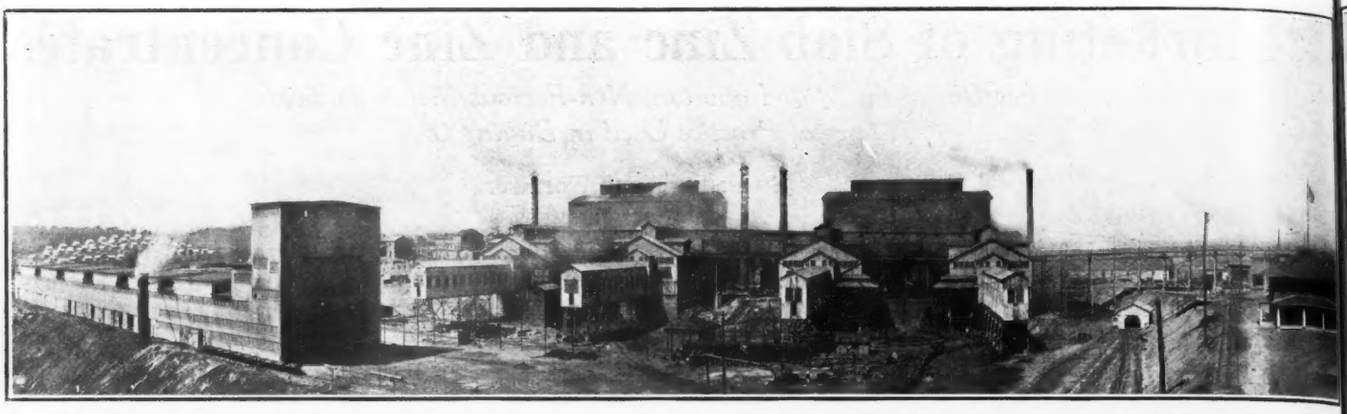
Specifications of Slab Zinc Grades

	High Grade			Intermediate			Brass Special			Selected	Prime Western		
	Grade A			Grade B			Grade C				Grade D		
	A.S.T.M. (*d*)	Ord. Dept. (*a*)	Navy Dept. (*b*)	A.S.T.M. (*d*)	Ord. Dept. (*a*)	Navy Dept. (*b*)	A.S.T.M. (*d*)	Ord. Dept. (*a*)	Navy Dept. (*b*)	A.S.T.M.	A.S.T.M. (*d*)	N. Y. Metal Exchange	Navy Dept. (*c*
Zinc, minimum	....	99.50	99.85	....	99.35	99.35	....	98.00	98.00	....	....	....	98.00
Lead, maximum	0.07	0.10	0.07	0.20	0.25	0.20	0.60	1.00	1.00	0.80	1.60	2.00	1.50
Cadmium, maximum	0.07	0.50	0.05	0.50	0.50	0.50	0.50	0.75	0.75	0.75	....	....	0.75
Iron, maximum	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.04	0.08	0.08	0.08
Sum of cadmium, iron and lead	0.10	0.50	0.10	0.50	0.65	0.50	1.00	1.50	1.50	1.25	....	....	2.00
Aluminum, maximum	None	None	None	None	None	None	None	Tr.	Tr.	None	None	None	Tr.
Other elements, tin, arsenic, antimony maximum	....	None	None	....	Tr.	Tr.	....	Tr.	Tr.	....	....	....	Tr.

(*a*) Specifications of March 7, 1918.
(*b*) Specifications of June 1, 1918.
(*c*) Specifications of Nov. 1, 1913.
(*d*) Revised specifications of 1918 of American Society for Testing Materials.

Note—A.S.T.M. specifications provide that the zinc be made from ore or similar raw material by reduction and distillation or by electrolysis, and produced from re-worked metal.

[1]The reasons for this attitude are explained in an article which appeared in the *Engineering and Mining Journal-Press* of Sept. 9, 1922, entitled, "The Case for and Against a Metal Exchange," by F. E. Wormser.



Orebins, sampler, crusher, and drier *Four roasters* *Acid plant* *Administration building*

One of the many zinc smelters in the United States—that of the American Metal Co. at Langeloth, Pa.,

tion of electrolytic zinc. Two large plants in North America now produce the metal by this means, the Anaconda Copper Mining Co. at Great Falls, Mont., which has a capacity of 75,000 tons per year, and the Consolidated Mining & Smelting Co. of Trail, B. C., which has a capacity of 45,000 tons. The Park City Mining & Smelting Co. has a smaller plant now inoperative in the Park City district, Utah. The Bunker Hill & Sullivan Mining & Concentrating Co. at Kellogg, Idaho, is planning to erect an electrolytic plant to treat Coeur d'Alene zinc ores. After it has been built the total North American capacity of electrolytic zinc plants will be about 145,000 tons per year.

The grades of slab zinc commercially used and supplied in the United States are five in number, Prime Western, selected, brass special, intermediate, and high grade—given in order of advancing purity. The American Society for Testing Materials has established the specifications indicated in an accompanying table to cover the five grades of slab zinc. During the war an attempt was made by the government to designate the various classes by letters, Grades A, B, C, and D, with specifications as shown. The zinc trade has, however, gone back to the old terminology.

The principal impurities found in slab zinc are lead and cadmium. Arsenic, antimony, tin, and iron are kept down to minute amounts.

The standard specifications for slab zinc[2] as established by the American Society for Testing Materials recommend the following practice in sampling lots and the settlement of claims:

Take ten slabs at random from a carload and saw each slab completely across from the middle of one long side to the middle of the other and use the sawdust as the sample; or, drill three 9-mm. holes along one diagonal of each slab, boring completely through and taking care to make fine drillings; the holes should be drilled as nearly as possible at the middle and halfway between either end and the middle of such diagonals. Go over the drillings or sawings with a powerful magnet to take out any iron which may have come from the drill or saw, and mix the sample thoroughly. The drill or saw shall be thoroughly cleaned before use, and no lubricant shall be used in either drilling or sawing.

Claims to be considered shall be in writing within thirty days of receipt of material at customer's plant, and the results of customer's test shall be given. The shipper shall be given one week from date of receipt of such claim to investigate his records and then shall either agree to satisfy the claim or send a representative to the plant.

(a) *Analysis by Car Lots.*—No claims shall be considered unless the minimum samples as specified for the grade in question can be shown to such representative.

(b) *Physical Defects of Individual Pieces.*—No claims shall be considered unless the spelter in question, unused, can be shown to such representative.

Where the spelter satisfies the chemical and physical requirements of these specifications, it shall not be condemned for defects of alloys in which it is used or for defects in the coating of galvanized products.

The maker's representative shall inspect all pieces where physical defects are claimed. If agreement is not reached the question of fact shall be submitted to a mutually agreeable umpire, whose decision shall be final.

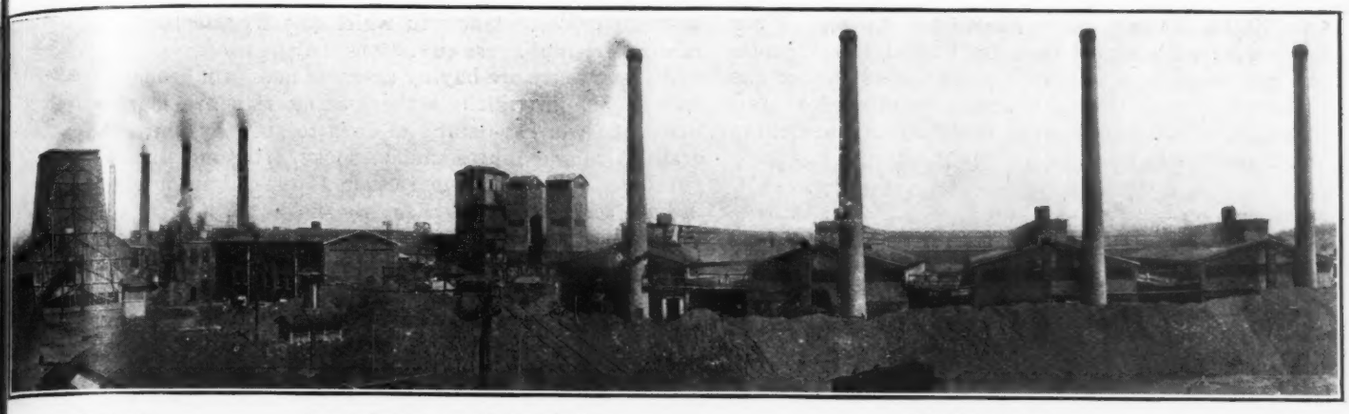
On a question of metal contents a sample shall be drawn by representatives of both parties as described under "Sampling," Section 6. The properly mixed and quartered sample shall be separated into three parts, each of which shall be placed in a sealed package, one for each party and one for an umpire if necessary. Each party shall make an analysis, and if the results do not establish or dismiss the claim to the satisfaction of both parties, the third sample shall be submitted to a mutually agreeable umpire, who shall determine the question of quality, and whose determination shall be final.

The expenses of the seller's representative and of the umpire shall be paid by the loser or divided in proportion to concession made in case of compromise.

In case of rejection being established, damages shall be limited to the payment of freight both ways by the seller for substitution of an equivalent weight of spelter meeting these specifications.

The largest amount of slab zinc sold is of the lowest grade, Prime Western, and approximately 60 per cent is consumed by the galvanizing industry, and a large portion of the remainder by the brass industry, which also digests part of the other grades. High-grade slab zinc is used in spun or drawn brass manufacture, the intermediate grade is used for brasses which do not need high ductility; brass special, as its name implies, for better quality brass which does not require much ductility; Prime Western for brass castings. The galvanizers generally insist that a small lead content is absolutely necessary to manufacture a properly galvanized product. Attempts have been made to persuade galvanizers to use high-grade zinc but not very effectively. Some galvanizers maintain that the "black sheets" will not coat easily if lead is not present in the zinc, although this claim is disputed by investigators, and that the use of high grade does not give the "spangled" appearance of the ordinary galvanized article and affects its ultimate consumption. The last is a plausible objection to the use of purer zinc if true, as it is difficult to educate consumers to buy new forms of old things. I recall seeing one large western pro-

[2]The Society uses the term "spelter."



Furnaces *Power house* *Mixing plant* *Retort furnaces*

which includes plants for utilizing the byproducts of smelting. This unit is coal-fired

ducer of high-grade slab zinc, which, of course, commands a premium over Prime Western, deliberately add lead to his remarkably pure product, because the market for high grade was saturated at that time and he could not dispose of his excess production without converting it to Prime Western or affecting the market for high grade. The question resolves itself into one of business economics. If one manufacturer uses Prime Western metal and satisfies his customers, the galvanizer using more expensive high-grade zinc can hardly be expected to compete with him unless he can convince the ultimate consumer that it is to his best interests to use a product made with the higher-grade metal.

The Machinery of the Market

Slab zinc is cast at the smelter or electrolytic plant into rectangular flat slabs weighing close to an average of 50 lb. Some companies adhere to the use of a slab running 40 to 45 lb. These slabs bear the brand mark or trade designation of the producer and also an indication of the grade. For convenience in breaking, the slabs are generally grooved to divide them into three or four parts. There is no standard shape. Some slabs have beveled edges and square corners, whereas others have rounded corners and no beveled edges. Each company seems to follow its own whims and early practice.

Inquiries and orders for zinc may come into the office of a producing company by mail, telegraph, or telephone, or through personal solicitation. The seller may frequently try to interest consumers in purchasing a round lot of metal, especially when the market is dull and stocks begin to accumulate. The consumer usually does a little "shopping" among producers before placing his order, to locate the one making the lowest offer. Occasionally a manufacturer will insist upon receiving a particular brand of slab zinc, in which event he may be called upon to pay a slight premium over the current general market value.

The time during which a consumer wishes to have his metal shipped to him has an important bearing upon the price quoted him by the producer. If he wishes to have shipment made in ten days or less, he is concerned with the prompt market; if shipment is wanted inside of the current month, near-by zinc is desired; beyond that interval future zinc is called for. These distinctions are not hard and fast and other opinions are found in the trade. Normally, the price of future or forward zinc is higher than that of prompt, owing to interest and other carrying charges, but often the normal relation between the positions is reversed and spot metal may sell above futures. This disturbance may be brought about by a shortage of spot zinc that is not expected to continue, or it may be due to an anticipated plethora of zinc a few months hence. The selling of future zinc is exceedingly common and is in decided contrast to the marketing of lead, in which future business is discouraged as much as possible by the leading producers.

Quotations are made in cents per pound or dollars per 100 lb. They are generally made no finer than 0.025c. per lb. A consumer may be given a quotation for immediate acceptance or within the hour, or may be given a longer interval, the remainder of the day, say, to decide upon acceptance, depending upon the activity of the market. The quotation that is made is an expression of the anxiety of the producer to have the consumer's business. Should the producer be well sold and in a comfortable position so far as stocks of metal are concerned, he may knowingly make a price higher than the general market level. At other times he may feel compelled through accumulation of zinc supplies to make a lower price so as to be sure to attract the order. Incidentally, the acceptance or rejection of a quotation by a consumer is one of the most important means a producer has for inferring the market level.

Contracts Usually Simple

After a consumer has agreed to a price either affirmatively over the telephone, or by wire, he sends the producer a confirmation by mail. The producer in the meantime sends a contract in duplicate, confirming the terms of the sale, to the purchaser. A typical form is given herewith. Of especial interest to the two parties is the price, description of the lot, tonnage, and time of shipment. If the contract is found in order by the buyer, he appends his signature in formal acceptation and returns it—the original contract—to the seller, keeping the duplicate. All transactions are upon a net cash basis; cash against documents is the usual method of settlement employed. In exceptional cases ten to thirty-day credits are extended.

Although quotations are commonly made f.o.b. East St. Louis for nearly all the Prime Western zinc sold in the United States, consumers may also be quoted a delivered price. In that event East St. Louis still serves as a basing point. Delivered quotations are sometimes slightly higher than f.o.b. East St. Louis prices plus freight, as a delay is involved in settlement for the purchases so that interest charges may be included in the delivered price. In the Middle Western manufacturing areas quotations are nearly all made f.o.b. East St. Louis basis; in the East they may be made on a delivered

basis. Quotations are rarely made f.o.b. smelter. When sales are made for export from the United States, quotations are made f.o.b. smelters on the west side of the Mississippi River. Zinc for export is shipped by rail to the Gulf direct from west of the Mississippi smelters at a comparatively low rate of freight.

A COMMON STYLE OF METAL CONTRACT

National Smelting & Refining Co.
120 Broadway
New York

Contract No......
.....19....

National Smelting & Refining Company sells and
.....**buys**

Product:
Quantity:
Price:
Delivery:
Payment:
Shipment:
(From Producing Plant or Ready for Shipment and Designated to Buyer) During .....

Conditions:

Shipping instructions and/or specifications to be given by buyer and received by seller on or before the tenth day of each month of shipment; if received later, shipment to be made at convenience of seller. As to the quantity of product to be shipped in any month, if shipping instructions and/or specifications are not received within thirty days after the tenth day of the month of shipment, seller may, at its option, cancel the sale, or sell such quantity for buyer's account.

Each shipment to be considered a separate sale.

Payment to be made in New York exchange. If payment is not made when due and as above provided, seller may at its option cancel this contract as to portion unfilled.

Shipments hereunder are subject to strikes, fires, floods, wars, delays or interruptions in transportation by rail or water, requirements or regulations of Government, and all other disabling causes without regard to the foregoing enumeration beyond seller's control; and this contract shall be deemed suspended so long as any such cause prevents or delays its execution.

In the event of breach hereof through the bankruptcy or insolvency of buyer, the damages of seller shall be measured by the then difference, if any, between contract price and market price of the quantity of product unshipped and/or unpaid for.

NATIONAL SMELTING & REFINING CO.
By.....

Accepted.....**19**.....
.....
By.....

One copy signed by the buyer to be returned to National Smelting & Refining Co., 120 Broadway, New York City.

Sometimes a consumer may be so located that he is affected by a peculiar relation in freight rates. Consumers in Chicago are so situated. To explain: The freight rate from East St. Louis to Chicago is 10c. per 100 lb.; from Oklahoma smelters to Chicago the rate is 24c.; from Oklahoma to St. Louis the rate is 17½c. Hence the through rate from smelter to consuming city is 3½c. less than the sum of the two local rates. The existence of this differential enables the seller to quote a price to the Chicago consumer 3½c. less per 100 lb. than he could without it. Instead of quoting, say, 7.10c. Chicago, when the East St. Louis price is 7c. he might quote 7.065c. (perhaps 7.075c.). Milwaukee is another city so situated. However, the anxiety of the producer for the business will govern the price he asks of the consumer and whether he will give him advantage of the freight rates or keep its benefits for himself.

The New York price of slab zinc is higher than East St. Louis by the freight rates between the two points. Intermediate points are charged the East St. Louis price plus freight. The Pittsburgh market price is no exception to the general rule, and is equal to the East St. Louis price plus freight. Pittsburgh zinc smelters are close to the largest consuming centers, but are situated further away from ore supplies than Middle Western plants.

Principal Ore Market in Joplin

The zinc smelters in the Middle West, with a few exceptions, do not operate mines. They procure their zinc ore in the Joplin, Mo., Platteville, Wis., and Rocky Mountain ore markets, directly from the miners. The Rocky Mountain zinc supply is nearly all bought on average price contracts in which the *Engineering and Mining Journal-Press* quotations may be used.

About twenty ore-buying agencies maintain headquarters in Joplin, which is the leading zinc ore market. Some of them have staffs of four to six men, but generally a single representative looks after all zinc ore purchases. They have more than 150 mines from which to buy, scattered throughout the field. Buying of ore takes place in the latter part of each week—chiefly on Saturday—and the purchases made by the smelter are a matter of individual negotiation with the miner. On Friday of each week both buyers and sellers have generally made up their mind regarding the price they will bid, or ask, respectively, for a given lot of ore and concentrate. The miners decide on an asking price on the basis of the reports of the zinc market as published in the newspapers or as wired them from New York brokers in close touch with the market and any private information they may possess. The smelter representative ordinarily has facilities for obtaining information through actual sales about the price of Prime Western zinc. He is naturally closer to the metal market than the miner.

Settlement prices are a matter of considerable dickering between miner and smelter. For years prices have been based upon concentrates containing 60 per cent zinc in the case of zinc blende and 40 per cent for calamine. When the grade of blende varies above or below 60 per cent, the usual practice is to add or subtract $1 per ton from the base price for each 1 per cent of zinc content above or below the basic figure. If sulphide ores run below 50 per cent zinc they are generally sold on contract. Iron in the ore is penalized at the rate of $1 per unit if present in excess of 1 per cent.

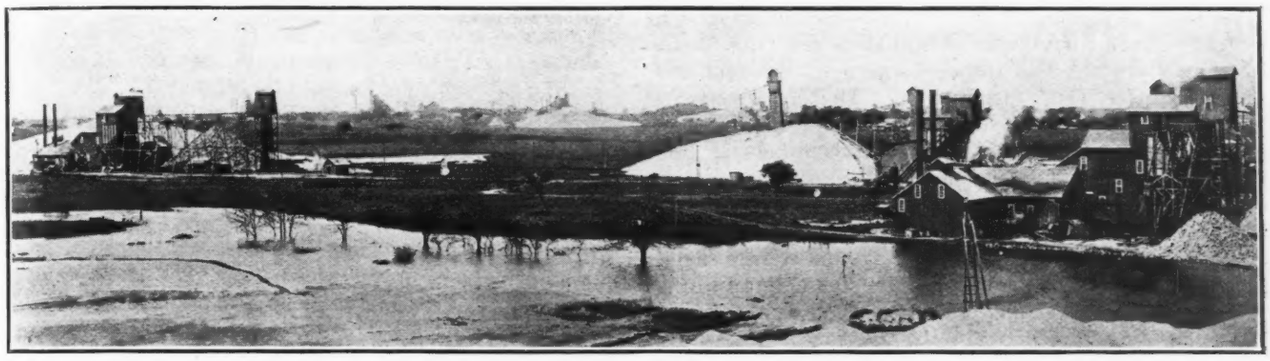
The prices quoted by the smelters in the Joplin market apply to concentrates in the bins of the producers. The smelters pay for the cost of loading, hauling the concentrates, and all expenses of transfer to their reduction works. Quotations are made covering the exceptionally pure ores and concentrates containing less than 0.2 per cent lead which are used in the production of high-grade zinc for rolling mills, and for Prime Western quality material, which may average about 0.2 per cent lead. The purer ores naturally command a premium. Fines and slimes, chiefly flotation concentrate, are also bought, but at a discount from the price of Prime Western ores.

General sampling practice followed in the Joplin market provides for a sample to be taken from the railroad car after it has been loaded. This is divided into three parts, one for the purchaser, one for the seller, and one for an umpire should the parties to the sale disagree over the assay. If the analyses of miner and smelter check each other within 0.6 per cent on moisture determination, the difference is split; otherwise the umpire is called upon to make an analysis, and the middle one of the three is taken. Similarly, in assaying for the metallic constitutents of the concentrates, the results of miner and smelter are averaged if the difference of zinc less penalized iron agrees within 0.6 per cent. If not, the umpire is again called in and the middle assay taken. The cost of having an umpire is borne by the party whose assay is farthest from the one finally accepted. Platteville sampling practice is not so standardized and depends upon the individual negotiations and specifications surrounding each sale.

The derivation of the $1 differential for zinc content

in ore and concentrates above or below the 60 per cent base which is used in Joplin may be considered as follows: The smelter estimates that it can recover about 83⅓ lb. of each 100 lb. treated, an estimate subject of course to wide variation, so that in each unit (20 lb.) of zinc smelted above the base price, 16⅔ lb. are estimated to be recovered. At an average zinc market of 6c. per lb., the recovery would be worth close to $1. In a 7½c. zinc market the differential figured on the same basis would be close to $1.25 per unit, but in a 9c. market, the differential would figure $1.50. No hard and fast rules obtain for the agreement on the use of a certain differential. On the same day in identical slab zinc markets, Joplin may use $1 and Platteville $1.25 as the differential.

In the last analysis a smelting company will estimate the price it can afford to pay in a certain market for a particular lot of ore and concentrates. It will so arrange a contract with the miners that that price is paid. If miner and smelter agree upon, say, a $1 differential for zinc content above or below the base, when the market points to the use of a $1.25 rate it is very likely that the difference may be made up by the use of a higher penalty than normal for iron and lime. The various penalties and variations from the base price enable settlement to be flexibly made.



The flat-lying appearance of the Middle Western zinc-producing fields which supply most of the zinc of commerce. Many mines with moderate production is the rule

The Value of the Ore the Ultimate Consideration

Quotations in Joplin and Platteville markets when reduced to a common denominator—the cost of a certain amount of zinc in a given lot of ore—are not far apart. An illustration may help to make this matter clear. Assume that the market price of Prime Western is 7½c. per lb., East St. Louis, and that 1 unit of ore (20 lb.) in the Platteville district is worth $1.25. Assume also that a 56 per cent zinc ore is being bought and that the base price is $47 (for a 60 per cent ore) in that market. The settling price for this particular lot of Wisconsin ore would be $47 minus 4 units at $1.25, or $5, which gives $42 per ton as the price the smelter would pay under these conditions disregarding any penalties.

In the Joplin market on the same day an identical lot of ore would be worth the same price—that is, $42. However, as the $1 differential is used in Joplin the base price on that day would be $42 plus 4 units at $1, or $4, which is $46 per ton.

The Joplin market is a leader, Platteville following its price movements closely. The location of a zinc smelter influences the choice of markets from which its ore supply is drawn. If a lower freight rate applies from Platteville than from Joplin, to smelter, the Platteville market will be favored. Ores from the Wisconsin field are penalized for lime content at the rate of 50c. per unit. The Joplin silicate ores, calamine, are generally penalized $1 per unit for sulphur over 1 per cent.

No rules and regulations have been definitely established to guide the buyer and seller of ores in the Joplin market. Sales customs and practices vary from those indicated. The market is highly unorganized so far as trading facilities are concerned. The relations between miners and smelters have not always been cordial. Each has had its own particular viewpoint about buying, selling and profits. It is natural that some friction should have existed. Happily signs are not wanting that ore buyers and sellers are now working in closer harmony than ever before. Being mutually dependent, they must pull together to profit in an active zinc industry.

A suggestion that smelters and miners settle upon some quotational basis has been frequently advanced, but has not met with much favor from the miners. It would appear that the miner would rather sell his production in an open market, using his own judgment when to sell and taking a chance that in the long run he can avoid the depressions in the market. That he actually does so is problematical. During the latter part of the war a scheme was evolved in which the price paid for Joplin ore was to be determined by a ratio varying according to the weekly average price as quoted in the *Engineering and Mining Journal*. An example will make this clear. When the price of zinc was quoted as 6c. per lb., the ratio was established as 6.80 to 1 and Joplin ore at the mines was quoted therefore at $40.80 per ton. As the value of zinc increased the ratio decreased, until in a 15c. zinc market, the ratio was fixed at 5.90 to 1, which gives a price of $88.50 for Joplin concentrates. Before the plan could be given a thorough trial the armistice was declared and the agreement fell through. The smelters today want a low ratio because of high smelting costs, whereas mining companies urge a high ratio—8 to 1 is a common view.

There are several good reasons why miners and smelters are content with the present methods of buying and selling ores and concentrates. In the first place, they both have an open market, with the advantages that go with one. In the second place neither miners or smelters are tied to long contracts that may be disadvantageous to one party or to both parties. Frequently custom smelters that use long-term contracts find themselves compelled to take large amounts of ores

when prices are low and the market for the finished metal poor, or unable to procure the supplies they wish when metal markets are excellent. In one case the smelter finds it necessary to accumulate stocks or to constantly participate in the unwilling metal market; in the other it may find itself handicapped in the execution of some of its metal orders and the possible loss of trade. These are, of course, reasons that apply particularly to the smelting companies, but it is a viewpoint that deserves to be considered. The existence of an ore market in which all the smelters can compete doubtless gives a flexibility to the market which would otherwise be lacking.

Many of the zinc miners obtain their ore from leases of Indian lands. The Indian owners of the land are paid royalties from production. The arrangements made are subject to the supervision of the Indian Office of the Interior Department. Were the miners to contract for their ore supplies on a quotational basis occasions might conceivably arise during which the price of ore on a Joplin basis would be higher than if sold on a quotational basis. At that time trouble might arise through a protest from the Indian agent maintaining that his protégés were not receiving their full share of the value of the ore.

The Work of a Live Zinc Association

The American Zinc Institute has done much good work in trying to bring miners, smelters and rollers together and guarding the interests of the industry. Another highly useful function which it performs is the collection of statistics relating to monthly production, consumption, and stocks of metal, which are given full and prompt publicity and furnish a clear picture of the statistical position of the industry. Although the zinc industry has been at times accused of being backward, its progressive handling of vital statistical information is far ahead of the copper and lead industries. The Institute also endeavors to widen the uses of the metal.

Zinc is used chiefly by the galvanizing, brass and sheet zinc industries. Galvanizers are by far the most important of the trio and consume about 40 per cent of the domestic production of slab zinc. Hence the condition of the iron and steel trade is a barometer of conditions in the zinc market. The activity of the galvanizing pots is a source of great moment to the zinc producers. Galvanizers use Prime Western zinc almost exclusively. Brass manufacturers use the purer grades —brass special and high grade, for which they pay a premium, about 10 to 15 points per lb. for brass special. Intermediate is produced to order and is rarely used. Rollers of sheet zinc also require the higher-grade products. Galvanizers are generally located near or in the large steel centers of the United States; brass manufacturers are found closer to the Atlantic seaboard, principally in Connecticut, (Bridgeport, Ansonia and the Naugatuck Valley).

The minimum quantity of slab zinc handled by the producer is the carload, which averages 33 tons.

High-grade slab zinc is sold by three manufacturers in the United States, The New Jersey Zinc Co., the Anaconda Copper Mining Co. (United Metals Selling Co.) and the American Smelting & Refining Co. The general practice in selling high grade is to make a delivered quotation when the zinc producing plant is situated in the West. The Anaconda Copper Mining Co., whose plant is at Great Falls, Mont., quotes only a delivered price, regardless of the location of consumers. The New Jersey Zinc Co. makes a quotation f.o.b. Palmerton, Pa., and will pay freight to destination not exceeding 30c. per 100 lb. The normal premium of high-grade zinc over Prime Western is from 1c. to 2c. per lb. The price of high grade varies slowly; changes in price are made infrequently; consequently, the premium is variable.

The United States has been the leading zinc-producing country of the world for many years. In 1921 it produced about 21 per cent of the world supply. Oklahoma is the leading ore-producing state, followed by Montana, New Jersey, and Kansas. A list of the primary zinc smelters of the United States and Canada, the location of their plants, and the brands of zinc which they make and sell are given in the accompanying table.

Slab zinc is a world commodity and as such is subject to the influences of world trade. The markets in

North American Primary Zinc-Producing and Zinc-Selling Companies

Company and Subsidiaries	Plant	Brand
American Metal Co., New York.		
American Zinc & Chemical Co. (*b*)	Langeloth, Pa.	A. Z. Co.
Bartlesville Zinc Co. (*b*)	Bartlesville, Okla.	B. Z. Co.
Lanyon-Starr Branch	Bartlesville, Okla.	Lanyon-Starr
	Blackwell, Okla.	(B. Z. Co.)
American Smelting & Refining Co., New York (*b*)		
United States Zinc Co.	Blende (*d*) Colo.	.....
United States Zinc Co.	Sand Springs, Okla.	U. S. Z. Co.
United States Zinc Co.	Henryetta, Okla.	U. S. Z. Co.
United States Zinc Co.	Kusa, Okla.	U. S. Z. Co.
United States Zinc Co.	Amarillo, Texas	U. S. Z. Co.
American Zinc Lead & Smelting Co., New York (*d*)		
American Zinc Co.	Hillsboro, Ill. (*d*)	Mascot; American Illinois
Granby Mining & Smelting Co.	East St. Louis, Ill.	Granby Granby Special Granby Select
American Zinc Co.	Columbus, Ohio (*d*)	.....
Anaconda Copper Mining Co., New York (*a*)	(*b*) Great Falls, Mont.	Anaconda Electric Anaconda Brass
	(*d*) Akron, Ohio	Special
	Chicago, Ill.	Anaconda Prime Western
American Zinc Products Co., Greencastle, Ind. (*c*)		
(Fort Smith Smelter Co.)	Fort Smith, Ark.	Old Chateau
Athletic Mining & Smelting Co., Fort Smith, Ark.	Fort Smith, Ark.	Service, Hilo.
Consolidated Mining & Smelting Co. (*a*)	Trail, B. C.	Tadanac
Eagle Picher Lead Co., Chicago, Ill.		
Picher Lead Co.	Henryetta, Okla.	Eagle Picher
Picher Lead Co. (*d*)	Hillsboro, Ill. (*d*)	Eagle Picher
Falcon Zinc Co.	Van Buren, Ark.	Falcon
Grasselli Chemical Co., Cleveland, Ohio (*b*)	Terre Haute, Ind.	Grasselli
	Meadowbrook, W. Va.	Grasselli
	Clarksburg, W. Va.	Grasselli
	Grasselli, Ind.	Grasselli
Great Western Smelting & Refining Co., Chicago, Ill.		
(Operates smelter of Missouri Zinc Co.)	Beckemeyer, Ill.	Missouri, Silver Star
Hegeler Zinc Co.	Danville, Ill.	Hegeler Brass Special Hegeler Selected Hegeler Standard
Illinois Zinc Co. (*b*) (*c*)	Peru, Ill.	Ilini, Izco
International Minerals & Metals Corp., New York.		
National Zinc Co. (*b*)	Bartlesville, Okla.	National
National Zinc Co. (*b*)	Springfield, Ill.	National
Matthiessen & Hegeler Zinc Co. (*c*)	La Salle, Ill.	M. & H.
New Jersey Zinc Co., New York (*c*)		
New Jersey Zinc Co. (*b*) (*c*) (*d*)	Palmerton, Pa.	Franklin
Tulsa Fuel & Mfg. Co.	Collinsville, Okla.	Horsehead
Mineral Point Zinc Co. (*d*)	Mineral Point, Wis.	Bertha
	Depue, Ill.	
Empire Zinc Co. (*d*)	Canon City, Colo.	Nassau White Bronze
Ozark Smelting & Mining Co. (*d*)	Cherryvale, Kan.	.....
Park City Mining & Smelting Co. (*a*) (Sold by A. S. & R. Co.)	Park City, Utah	Judge-Electric
Quinton Spelter Co.	Quinton, Okla.	Quinton
Sandoval Zinc Co., Chicago	Sandoval, Ill.	Sandoval
United States Steel Corporation, New York		
Edgar Zinc Co.	Cherryvale, Kan.	Edgar
Donora Zinc Co.	Donora, Pa.	U. S. S. Co.
United Zinc Smelting Corp., N. Y.	Moundsville, W. Va.	Media, Clarksburg
Amalgamated Zinc Lead Smelting Co.	Henryetta, Okla.	.....
Western Zinc Oxide Co. (*d*)	Leadville, Colo.	.....
Weir Smelting Co.	Caney, Kan.	.....
Victory Metal Co,	Henryetta, Okla.	.....

(*a*) Electrolytic zinc production.
(*b*) Also produces zinc dust.
(*c*) Also produces rolled zinc.
(*d*) Also produces zinc oxide.

various countries move parallel with each other. Any tendency to move out of line is corrected by arbitrage transactions in which dealers take advantage of a difference in price relations between markets to sell or ship metal from the market with the lower price to that having the higher one.

The London Market Highly Organized

The market which is watched most closely by American producers is that in London, where an active and well-organized Metal Exchange functions in the major non-ferrous metals. The members of this exchange deal at specified intervals during the day, in contracts covering "virgin spelter" (they still use a term now almost obsolete among American producers) of good merchantable quality, which is defined as "virgin spelter resulting from the distillation of zinciferous materials." "Options," "puts," "calls" and "straddles" are bought and sold in the comprehensive machinery of the market; a "put" being an option to deliver, and a "call" to buy a certain amount of slab zinc at a certain time and price. A "straddle" is an option giving both of these privileges. The metal is contracted for shipment during a named month, which is understood to mean shipment on or before the fifth of the month following or by a steamer due to arrive within the month named. The smallest lots sold are twenty-five tons each. A delivery is considered good if it takes place free ex warehouse, ex quay Liverpool, or free on rail at Swansea in the seller's option. Zinc on board a steamer and shipped from a port in Europe or the Atlantic Coast of the United States within the delivery month named is also considered good delivery, irrespective of the arrival date.

Unlike the American slab-zinc market, London is the center of much speculation; brokers play a leading part in the transactions that are made. The view is commonly held abroad and occasionally in the United States that speculation is necessary to furnish a broad market, but both great markets are wide apart on that score. American practice is to deal directly from producer to consumer; European to use middlemen. Both practices have advantages and disadvantages.

Normally the United States is not a zinc-exporting country. In fact, it receives tariff protection to prevent the importation of a large amount of metal for consumption, but owing to the chaotic condition of European affairs and the dearth of an adequate supply of zinc from Australia, Belgium, Germany, and Poland, the United States has lately become a zinc-exporting country. The situation is not expected to be permanently altered.

Making a Mole Hill Out of a Mountain

How Radium Is Extracted from Katanga Ores in a New Plant at Oolen, in Belgum— Marked Price Reduction

A YEAR AGO there was an almost uninhabited patch of land at Oolen, not far from Antwerp, which has today become a comparatively large manufacturing center. Here tons of raw material may be seen entering, and yet nothing, apparently, is turned out, says a correspondent of *The Times* of London. Here the most up-to-date and the largest radium-extraction plant has been built during the last eighteen months, and quantities of radium will be produced that would have been regarded as fantastic ten years ago.

The radium position has entirely changed, through the discovery in 1913 of new sources of uranium ore in the Belgian Congo. The Union Minière du Haut Katanga, well known in the mining world, directed its attention to the treatment of these ores immediately, but the outbreak of war obliged it to concentrate its energy on the production of copper, and it was not until just over a year ago that the question of radium extraction could be taken up once more.

Even in this rich ore there is, roughly, speaking, only one part of pure radioactive matter in ten to twenty million parts of mineral. The extraction, therefore of even a few grams a year involves the treatment of a large quantity of raw material. Many novel features in the way of chemical plants have been devised.

The ore is first crushed into a fine powder, and then digested with acids, until the foreign metals, such as uranium, iron, copper, and lead, are eliminated. This involves forty different operations, resulting in the isolation of a small amount of barium salts which contain, roughly, one part of radium element in 125,000. The monthly output, resulting from the treatment of many tons of raw material, is about half the size of an ordinary lump of sugar, but it will so much more than meet the world's present demands for radium that a great deal of research has been instituted to discover if possible some application of the element to industrial work. There is reason to believe that already one use of far-reaching importance has been found.

Briefly, the mineral, after treatment with acid, is subjected to a process for the complete elimination of lead by means of sodium chloride; a further treatment follows with hydrochloric acid, to remove the calcium. Next follows treatment with sodium carbonate to eliminate the sulphuric acid formed in a previous reaction. Throughout these operations the radium-barium compounds remain in an insoluble form, mixed with silica. Treatment with hydrochloric acid follows, which dissolves the radium-barium salt, which is then again precipitated with excess of acid. Each operation necessitates filtration with filter presses.

The residues are then put through the entire treatment all over again, to extract any radium that may have been lost in the first cycle. Special care has been taken in the design of the plant to minimize loss, and the installation is probably unique in many points of chemical engineering. The plant covers many acres, and will serve to produce probably three or four grams of radium element every month. There has been actually produced so far in the world about 160 grams of radium. The greater part of this has been derived from Colorado and Utah, but the American producers have decided, in view of the richness of the Congo ore and the corresponding low price at which it can be worked, to close down their mines for some years. Such a dramatic situation has probably never before arisen in the history of mining.

The price of radium has come down by several thousands of pounds per gram as the result of the working of the Katanga deposits, and this fact alone may act as an inducement to fresh research in the way of industrial application.

Mine Owners Should Know Rights Under Law of Eminent Domain

Court Decisions on Statute, as Conveying Competency to Force Roadway Over Property of Others, Are Inconsistent

By Leslie Childs

THE question of the right of a mine owner to force a roadway across the lands of others to gain an outlet for his property is one of importance to mine owners in general. It has been the subject of considerable litigation, which for the most part has been based upon statutory enactments which gave mine owners this right under the law of eminent domain. However, the courts of the various states are not in accord in construing such statutes, and though in some states acts of this kind have been upheld, in others they have been declared unconstitutional. The reasoning followed by these different rulings may be more clearly illustrated by a brief review of a case of each class than by any other method. A case of each class, therefore, will be briefly examined, and as an illustration of that type of cases which holds that the application of the law of eminent domain cannot be invoked to condemn property in aid of mining operations, Consolidated Channel Co. *vs.* Central Pacific R.R. Co. *et al.*, 51 Calif. 269, will serve. The facts involved, briefly stated, were as follows:

Mining Company Attempted to Condemn Right of Way

The Consolidated Channel Co., a corporation, owned a gold mine in Nevada County, Calif. The property was valued at $60,000 and the company had spent large sums of money in development. The mine was on Squirrel Creek, and it appears that owing to the light grade of this creek the property could only be operated by the building of a flume of considerable length to carry off the tailing. To do this it was necessary to pass over the land owned by the defendants, for a certain distance.

The plaintiff company thereupon brought the instant action against the defendants, in which it was sought to have a right of way condemned for flume purposes. This action was predicated on an act of the California Legislature which gave mine owners the right to have property condemned, in certain cases, in aid of mining operations. The lower court found against the plaintiff, and denied the right to have the flume way condemned. From this judgment an appeal was taken to the California Supreme Court, where in passing upon the question in issue between the litigants in the case the court said:

"It is clear, from the averment of the complaint, that the object sought is the appropriation of the private property of the defendants to the private use of the plaintiff. The proposed flume is to be constructed solely for the purpose of advantageously and profitably washing and mining the plaintiff's mining ground. It is not even pretended that any person other than the plaintiff will derive any benefit whatever from the structure when completed.

"No public use can possibly be subserved by it. It is a private enterprise, to be conducted solely for the personal profit of the plaintiff, and in which the community at large have no concern. It is clear that this case does not come within the meaning of that clause of the Constitution which permits the taking of private property for a public use after just compensation made."

In conclusion the California Supreme Court affirmed the judgment of the lower court, holding, in effect, that a statute, giving the right to condemn property under the law of eminent domain to aid mining operations, would not be enforced where the condemnation proposed was not touched with a public interest but was for the benefit of private persons only.

The Other Side of the Question

Let us now examine a case in which the taking of private property under similar conditions was upheld. For this purpose Highland Boy Gold Mining Co. *vs.* John Strickley *et al.*, 28 Utah 215, will be of interest.

In this case the Highland Boy Gold Mining Co. brought an action to condemn a right of way for an aërial tramway over certain land owned by the defendants. As in the California case reviewed, this action was based upon a statute which declared that, under certain conditions, the right of eminent domain might be applied in thus providing outlets to mining property. The defendants' case was predicated on the ground that the statute in question was in conflict with the provision of the Utah Constitution, which provided that private property should not be taken for public use without just compensation, the contention being that as the instant case had for its object the condemnation of private property, for the use of the owner of other private property, it was not for the use of the public and such condemnation would be unconstitutional. The lower court decided in favor of the plaintiff mining company, assessed damages to be awarded to the defendants, and condemned the right of way. On appeal the Utah Supreme Court upheld this judgment, and in doing so said in part:

"The mining industry in this state is second in importance only to that of irrigation, and this court has held . . . that the construction and operation of irrigation ditches is a public use. . . . It being conceded . . . that the construction and operation of irrigation ditches in this state is a public use . . . it follows that the construction of roads and tramways for the development of the mining industry is a public use, as the same line of reasoning that applies in support of the doctrine in the one case holds good in the other. . . .

"The act of the Legislature under consideration makes ample provision for the payment of a fair price to the owner for lands sought to be condemned, and for all damages that he may suffer because of such taking, and is therefore valid. . . ."

"Public Use" Determines Applicability of Principle

In conclusion the court affirmed the judgment rendered in the lower court in favor of the plaintiff, holding, as outlined in the opinion, that the operation of mines in the State of Utah was such a public use as to justify the exercise of the right of eminent domain in condemning roadways and other outlets to such property.

The two foregoing decisions are fairly representative of the reasoning followed by the holdings in their respective classes. In the light of these holdings it is obvious that the question of whether or not a mine owner may force a roadway to his property may depend in a great measure upon the state in which he is operating. The question of the right to condemn a right of way is one of such vital importance to the owner of mining land that it may mean the difference between a workable property and one that cannot be worked, and it should never be overlooked where property of this kind is being acquired.

Interconnection of Contiguous Mines

An Additional Safety Precaution, Proposal of Which Presents Many Difficult Questions

By George J. Young
Associate Editor

THE DISASTER at the Argonaut mine last year has brought into prominence the question of establishing connections between contiguous mines. Connections between mines have been made voluntarily and are not uncommon. Their purpose is to facilitate operations, to improve ventilation, and to effect drainage. Ordinarily they have been constructed as a means of exit during emergencies. In a general way the practice is a good one, but there is a question as to its applicability under all conditions.

In the case of the Argonaut and the Kennedy mines the obvious appeal to most engineers who have studied the question is that a connection would have given an additional chance to the imprisoned men and that had such connection been available there would not have been as great a loss of life—if any. However, no one can affirm confidently that this would have been the case. It is not unreasonable to conjecture an opposite condition: that with connections the fire might have spread to the Kennedy and endangered the workmen in that mine. The stoppage of the ventilating fan of the Argonaut and carelessness on the part of the workmen from the Argonaut might have resulted in the filling of the Kennedy with smoke and gas. If equal weight is given to both conjectures, the logical conclusion is that connections between such mines are at least a questionable expedient, for without such connections, all possibility of a disaster spreading to a neighboring mine would be avoided and the danger in one mine would be restricted to that mine.

Property Rights Cannot Be Changed

Each mining property is given certain fixed rights with respect to property, organization, and most of the details of operation. Certain operating principles are, however, reserved and determined by an *ex parte* individual such as the Industrial Accident Commission of California, for the purpose of securing a greater degree of safety to the men employed underground. The law recognizes that safety is relative and depends largely upon the individual directly concerned, upon his knowledge, upon his quickness and upon his concern in his own safety. Under the conditions of mine operation it is impossible to have men work at all times under direct supervision, and therefore the presumption is that the workman must take care of himself. However, every reasonable precaution dictated by good mining practice should be taken by a company, and this is a requirement exacted by such bodies as the Industrial Accident Commission. The commission exercises more or less definite control over operations at each property, but, although it may order certain things to be done, it cannot guarantee that these things will do what it supposes that they will do. The company retains full responsibility and must therefore have equal right to accept or reject what the commission proposes as safety precautions.

The management of a mine is familiar with both its operating conditions and with the workmen whom it employs. Presumably it is in the best position to pass upon the applicability of the commission's orders. The commission's engineers do not represent the last word in mining practice, nor are they necessarily experienced in the workability of the orders they propose to enforce. Their information is based more or less upon belief and what has become the custom under other circumstances. If their orders are to be superimposed upon mining properties, the responsibility for their outcome should rest entirely upon the commission. Under the circumstances the commission would have to assume responsibility for the operation of the mine. This would not be practicable. The property right and the operating responsibility are fixtures which cannot be changed. Necessarily, they imply consent on the part of the owners in enforcing new, unusual, or safety orders of dubious applicability. In the specific case of connections between neighboring mines the consent of each mining organization is, in my opinion, an essential condition to its fulfillment. If either mine has compiled with existing safety orders to a reasonable extent, or if both mines have so acted, the further requirement for connections might well be an unreasonable provision in one or the other case, or in both cases.

Connections Divide Responsibility

The law contemplates fixing responsibility upon single organizations. If connections are established between neighboring mines, the responsibility becomes divided. One mine might do everything that is required. The other mine might neglect its share. It is impossible for the mine to control the operations of the other to the extent that it would compel maintenance of the connections in proper condition. This would devolve upon the commission. Unless co-operation between both mining properties is effected, the connection would become a bone of contention involving the three parties. Thus attention would be distracted from other safety precautions and in the end greater danger would arise.

Paralleling of Operations Presupposed

The number and kind of connections would have to be specified in the instance of two mines. The ideal condition presupposes that both mines would essentially parallel their operations and would include in their development program provision for making the necessary connections. Under some circumstances this might be the case, but operating policies of both mines might be essentially different. One mine might be exploring and the other stoping. Although both mines might be near each other, their work underground might be far apart. It would be extremely difficult to reconcile two mines whose operating policies are divergent. A proposed law introduced in the California Legislature provides that mines the workings of which are within 1,000 ft. of each other must be interconnected. It would be illogical and manifestly unfair to require two mines where chance had thrown them in proximity to maintain connections where two other mines that happened to be 1,001 ft. apart would not have to maintain

connections. It would be difficult to reconcile the essential equities of two properties on any other basis than of mutual consent by and as between the interested parties.

Ventilation and Drainage Affected by Interconnection

Interconnection would represent an additional danger in underground ventilation in the event of carelessness in maintaining proper bulkheads and doors. It would also divide responsibility in respect to maintaining proper ventilation in both mines. There would be also the additional danger of fire spreading from one mine to the other through the meddling with division doors by unauthorized persons.

Interconnection would presuppose an agreed-upon policy with respect to mine drainage. One mine might have a serious drainage problem and the other might be relatively free from this difficulty. Intercommunication would relieve one mine and add to the troubles of the other. It is obvious that inequities difficult of adjustment would arise as between two neighboring properties.

New Interpretation of Safety Laws Necessary

Intercommunication would call for a new interpretation of safety orders and existing laws providing for two exits. Various questions arise. Would it be necessary for two interconnected mines to have separate emergency exits? Could both mines be ventilated by one system? Would it be necessary for both mines to be completely equipped with fire-fighting equipment? It is evident that complete safety rules would have to be worked out to apply to the interconnected mines as a group.

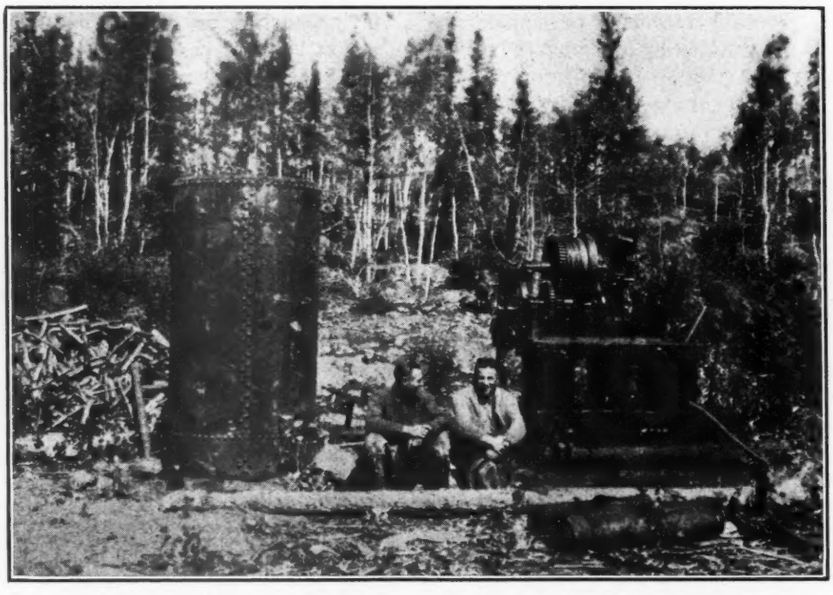
If interconnection is provided for each 300 ft. of depth and each connection is 1,000 ft. in length, for each 1,000 ft. in depth two mines would have to drive 2,000 ft. of connections and maintain this length of opening. This would cost from $20,000 to $30,000. The expense for maintenance would range from a nominal figure up to $5,000 or more per annum. Thus an additional capital expenditure of from $35,000 to $50,000 for each 1,000 ft. of depth would result from the application of interconnection. The case might well arise where this would be the deciding point between shutting down and operation.

Conditions Should Govern Application of Law

The ore deposits followed by the gold miner are irregular. Pay shoots are scattered. It is the exception to find continuous pay shoots over great depths. Interconnection presupposes a degree of regularity which exists only in exceptional cases. Every gold miner would like to have his deposit of a regular character so that he could lay out an ideal mine. Unfortunately, the ideal mine layout is of rare occurrence in gold mining. Interconnection followed to its logical conclusion would seriously restrict gold mining by causing an unusual and unnecessary amount of dead work.

However, interconnection is worthy of consideration as an added but not as a primary safety precaution. It is obvious that two well-managed properties that are self-contained with respect to primary or fundamental safety precautions, and that have developed an effective safety practice, are safer mines than are two mines that have indifferently met their obligations in this respect and rely upon interconnection to compensate for their shortcomings. Safety orders should be predicated upon the individual mine as a unit, and interconnection of neighboring mines should be determined by the companies concerned where it is practicable.

A Phase of Prospecting—Results Here Were Disappointing



Diamond drill outfit at Copper Lake, Manitoba, taken in over snow and ice in winter

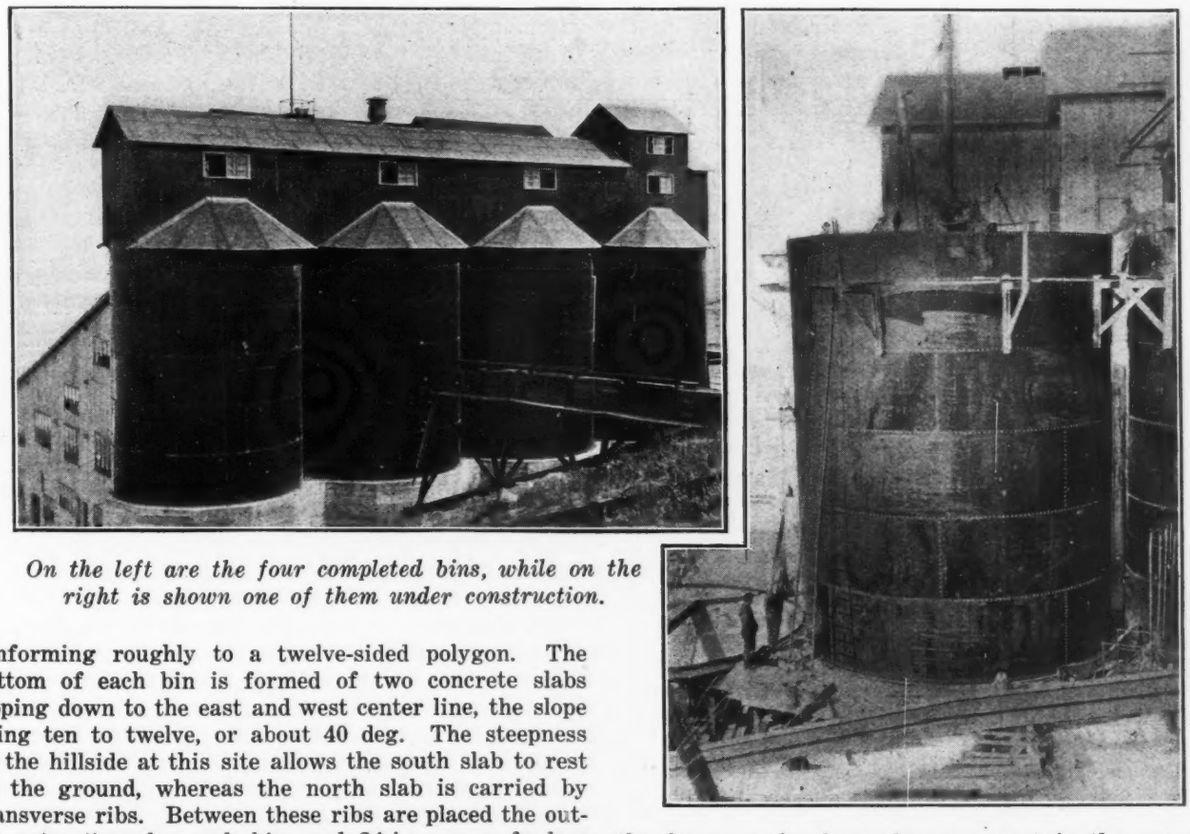
New Timber Butte Bins

Four Steel Tanks with Concrete Hopper Bottoms Give 4,500 Tons, Secondary Ore Storage Capacity

By W. J. Tait
Timber Butte Milling Co., Butte, Mont.

FOUR new secondary-storage bins of 4,500 tons' capacity have recently been built at the Timber Butte mill, Butte, Mont. These are circular steel bins and are set in a line east and west. Their diameter is 25 ft. and the height 32 ft. from the foundation to the top of the steel tank. The height and position of the bins was largely determined by the extension of the conveyor systems to the bins and from the bins to the mill.

The bins are set on concrete foundations in sections conforming roughly to a twelve-sided polygon. The bottom of each bin is formed of two concrete slabs sloping down to the east and west center line, the slope being ten to twelve, or about 40 deg. The steepness of the hillside at this site allows the south slab to rest on the ground, whereas the north slab is carried by transverse ribs. Between these ribs are placed the outlet gates, two for each bin, and 24-in. apron feeders delivering the ore to 20-in. belt conveyors. These feeders, conveyors, and their drives are housed by the bin foundation.



On the left are the four completed bins, while on the right is shown one of them under construction.

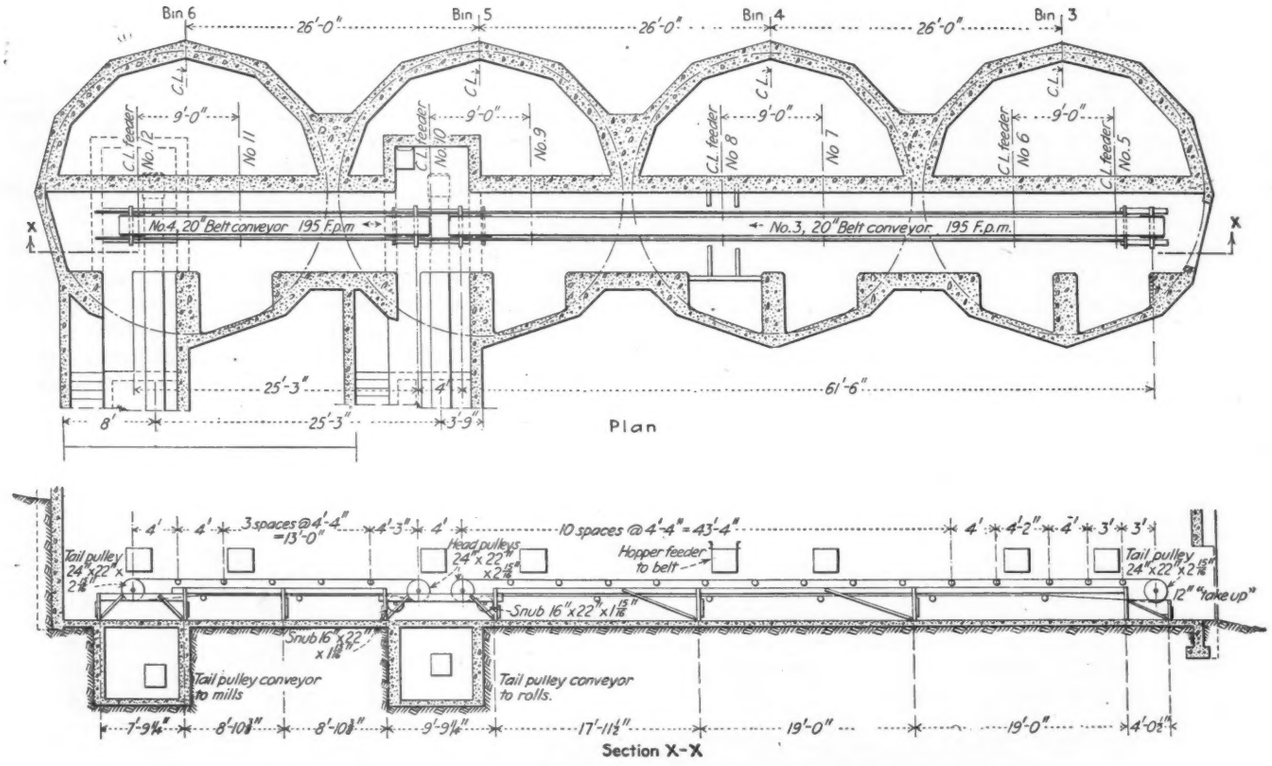
In the usual milling operations, each of the four bins may feed the belt to the rolls. In addition, ore bin No. 6 may be used separately as a supply for another milling circuit by the reversal of the short conveyor under the feeders, without affecting the regular operation of the other bins.

In the design of the bins comparative estimates were made for framed timber bins; for round steel bins with a flat bottom and gates at one side; for round-bottom steel bins; and for the combination of steel bin and concrete hopper bottom which was adopted. The hopper bottom has an advantage in emptying, and, because of the housing furnished by the foundation for the conveyors and feeders, proved to be the cheapest bin per ton of storage capacity.

The bins are filled by a 24-in. belt conveyor and tripper running east and west over the line of bins. The housing for this conveyor is formed by two rows of trusses, spaced 12 ft. center to center, carried on the top of the bins, the upper course of the bin plates being made a little thicker to take the concentrated loadings from the conveyor and housing. The sectors of each bin not covered by the conveyor housing are covered separately by semiconical roofs.

Work was not started on these bins till late in the fall and was carried on through the cold weather almost without interruption. Steam mains were laid in the feeder and conveyor space under the bins as the forms were built, and the runways for wheeling concrete were made into a roof to retain the heat around the forms. In addition, a curtain wall was run along the north side and around the west end, braced out from the forms, and salamanders were set in the space so formed. Hot water was used in mixing, and the aggregate was piled on a platform leveled up from the sloping ground and housed so the aggregate piles could be heated from beneath. The pouring of concrete was scheduled to take advantage of the weather and to push each bin foundation to completion as a unit. This made the protection of the green concrete easier and also allowed the steel erection to proceed without delay. By this arrangement, two bins were in use before the last two were completed, and three before the fourth was finished.

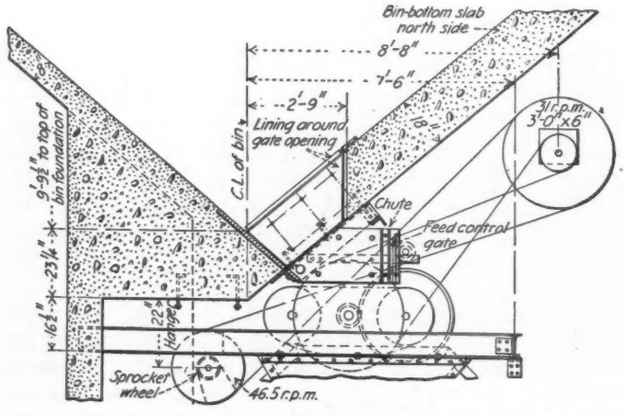
The equipment used in erecting the steel was made up from materials at hand. A guy derrick was set up in the center of a bin foundation, and all the bin tank steel was erected by this derrick. A gin pole was set on skids over the tank, and this pole was walked along, erecting the superstructure passed to it by the derrick, and handling the derrick mast and boom out of one



Foundations of the four steel bins, and manner of placing the belt conveyor

tank into the next. The rivet heater was set on a platform pivoted on the derrick mast and raised with each plate course erected. This platform swung around the circumference of the tank and, with the usual inside and outside riveting chairs riding the edge of the tank, made a safe and convenient arrangement without the use of scaffolding. For finishing the bin tops and roofs, brackets were fastened around each bin just below the top, and planks were laid from bracket to bracket.

The plans for these bins and their erection were developed by the engineering department of the Timber Butte Milling Co., L. L. Quigley, chief engineer, and by the writer, chief draftsman. Nelson & Pederson, of Butte, were contractors for the concrete foundation. The Kansas City Structural Steel Co. was the fabricator of the steel; and the erection was done by the Timber Butte Milling Co.



Concrete bottom of bins, and chute gate.

These hopper bottoms have the advantage of making the bins easy to empty.

Why Chinese Metallurgy Is Backward

It is surprising to find, says A. S. Wheler in the August *Bulletin* of the Institution of Mining and Metallurgy, in a country where many of the arts and sciences were highly developed 2,000 years ago, and whose historical records state that gold, silver, copper, and other metals were known and used as currency or for the manufacture of implements fully 4,000 years ago, that metallurgical science should be practically unknown, and smelting operations conducted with the crudest of appliances. Yet such is the condition of affairs in China today, though rapidly changing with the introduction of western methods. The reason for this anomaly is not far to seek, for the Chinese miner has suffered a measure of oppression and suppression from his rulers that is without parallel in the history of any country, although in most countries the early miner received little in the way of encouragement or approval. "Feng-shui," or necromantic superstition, was almost entirely responsible for this attitude, and the belief that there are spirits in the elements which must not be annoyed or disturbed, lest they bring disaster to the locality, has by no means died out in China, and is, in fact, still responsible for much opposition to the mining industry.

Thus, superstition, coupled with the prejudice that any form of manual labor was derogatory to gentility, left the development of the sciences of mining and metallurgy to a class which was long considered as outcast—and on a par with soldiers, actors, and barbers! Hence it came about that no educated or trained minds were directed toward the winning of metals, and, as there was no interchange of ideas with the outer world of "barbarians," such progress as was made was the outcome of a slow process of evolution, and handing down of methods from father to son, with perhaps some occasional improvement in a century.

The Petroleum Industry

Recapping "Wild" Gas Well Tests Nerve and Ingenuity

Casing Cut with Steel-jacketed Rifle Bullets—Old Smokestack Diverts Flame While Operation Is Completed

TO BE CALLED UPON to control and recap a gas well "running wild" and spouting a sheet of flame seventy-five feet in the air, and to do this by shooting off the broken valve by means of steel-jacketed bullets from a rifle, was the recent experience of engineers of the Canadian Government in the course of their unending campaign to prevent a wastage of natural resources, no matter where located and regardless of the difficulties involved. While the regulations governing oil and natural-gas development explicitly state that all mishaps on leases must be corrected by the operator, it has on a number of occasions happened that through the failing of valves and cappings, or the tampering with fittings and equipment by ignorant or maliciously disposed persons, wells have become a menace to the field and wasters of gas or oil.

The capping of a natural gas well at Pelican Rapids, on the Athabaska River, about 165 miles north of Edmonton, Alberta, had, for some unknown reason failed, and the resulting flow of gas became ignited. The petroleum engineer of the Department of the Interior who went to investigate found that the opening through which the gas was escaping produced a flame of a peculiar shape, with one end beating on the ground close to the casing. The intensity of the heat generated was so great that the pipe and fittings were heated to incandescence and it was clear that nothing could be done until the fire was extinguished. This had to be done with what equipment could be improvised on the ground.

"Shooting Up" the Well

The first step in the operation was to change the shape of the flame so as to make it possible for men to work in closer proximity to the casing. This could only be done by cutting the casing below the control valve and allowing the gas to be discharged upward and the flame to take the shape of that of an ordinary candle. A Lee-Enfield rifle was employed to cut the casing and this was set up on a tripod at a distance of twenty-five yards from the target. Steel-jacketed bullets were used, and during the firing of the first twenty-five rounds the especially dangerous features of the work were encountered. Jets of burning gas, necessarily lined directly back on the rifle, were forced through the new openings caused by the rifle fire. The noise of the gas, under pressure of over two hundred pounds to the square inch, escaping through the bullet holes, was so great that cotton wool had to be placed in the ears of the workers to protect their ear drums. However, as the number of rounds fired increased, and with it the size of the opening, the more spectacular and dangerous features of the operation gradually disappeared and after about two hundred rounds had been used the valve separated from the casing and the flame rose like a torch to a height of seventy-five feet.

The next problem was to extinguish the flame. Roughly outlined, the scheme was to drop one end of an iron smokestack, about thirty feet long, over the casing, then to incline it slowly until the base of the flame was carried as far as possible to one side, when, by unshipping the bottom of the stack, it was hoped to create a gap between the top of the casing and the base of the flame long enough to prevent re-ignition. As a boom derrick could not be used, a steel cable was run from an old drilling derrick to a tree, to which was rigged a trolley controlled by guide wires. The old stack was then suspended from the trolley and run in opposite the flame and the lower end drawn by guide wires until it was directly over and about one foot above the casing. The consequent draft caused the gas to flow into the stack and burn from the top. After this had continued for sufficient time to get the casing cool the lines holding the bottom were released, thus cutting off the gas supply at its head and extinguishing the flame. This was an anxious moment, but the operation was successful and the big flame at the top of the smokestack died out without igniting the gas pouring out of the casing. The work was then completed and the well left in such condition as to be safe and at the same time ready to be again operated when the necessity arose.

Russian Oil Output About Half 1913 Production

Production of oil in Soviet Russia in the second quarter of 1923 amounted to approximately 9,500,000 bbl., according to information abstracted by the Eastern European Division of the U. S. Department of Commerce from the official Soviet press, for the accuracy of which the division assumes no responsibility. Production of oil, number of wells in operation and in drilling, and the output of the refineries in the principal oil fields of Soviet Russia during the second quarter of 1923 are represented as follows:

Production of Oil, Second Quarter, 1923

In poods (one barrel equals about 8.4 poods)

Months	Baku	Grozny	Emba
April	18,140,000	6,720,000	724,000
May	19,040,000	7,704,000	712,000
June	19,058,000	6,959,000	621,000
Total	56,238,000	20,883,000	2,057,000

Grand total, 79,178,000 poods, which equals 9,426,000 barrels.

The average monthly production for the quarter—26,393,000 poods—compares with an average monthly output of 47,000,000 poods in 1913. The number of wells in operation and in drilling, the output of refineries and current shipments, are shown in the following table.

Status of Russian Wells, Refinery Output, and Shipments Second Quarter, 1923

	Wells in Operation	Wells Drilling Number of Wells	Wells Drilling Footage	Output of Refineries (Poods)	Shipments (Poods)
Baku					
April	1,489	182	15,563	10,473,000	13,264,000
May	1,493	199	15,610	10,710,000	18,500,000
June	1,518	207	20,664	No data	No data
Grozny					
April	227	39	3,031	5,800,000	3,899,000
May	242	47	5,698	4,856,000	4,483,000
June	247	51	6,671	4,815,000	No data

In the Emba fields, in the Ural region, 52 wells were in operation in May, and 53 in June.

DISCUSSION

"Engineering and Mining Journal-Press" is not responsible for statements or opinions published under "Discussion." In many cases the views expressed are diametrically opposed to editorial policy and belief.

Anaconda's Position

THE EDITOR:

Sir—Your very interesting editorial in the issue of July 21 regarding North Butte and Anaconda, in which might be included Chile Copper, is quite timely. It is quite evident that Anaconda is earning nothing at present from her 216,000,000-lb. copper production from the Butte mines and with $150,000,000 of bonds outstanding on which the interest must amount to $10,000,000 a year, to offset which there is received approximately $5,500,000 in dividends from Chile Copper.

There appears to be a deficit of about $4,500,000 to be more than made up by the profits from American Brass Co., which appear from the selling price of brass above the price of copper to amount to about 2½c. per pound or roughly $5,000,000. As Anaconda is, however, paying $3 per share yearly, say $9,000,000, there must be other sources of revenue. It should be noted that Anaconda, including the Amalgamated Copper period, has averaged 4 per cent for twenty-four years; this is now raised to 6 per cent.

It is a natural query how long these great copper mines or any other American copper mines can continue to operate where all profits go to the workers and manufacturers of supplies. Every mine in the United States is working short handed and most of them at a loss. There appear to be half a dozen copper mines turning out copper below 10c. per pound. Do you consider North Butte the beginning of the end and that many others are likely to follow? WILLIAM TUDOR.

London, England.

English Zinc Mines Non-existent

THE EDITOR:

Sir—Under the caption "More Work Needed" you refer editorially in your July 21 issue to a dispatch published by the *Wall Street Journal* in which an official of the Zinc Corporation disparaged "English" labor. It is just the technical press which should have put the *Wall Street Journal* right on its facts. The Zinc Corporation was undoubtedly referring to labor conditions in Australia, where its activities are centered. If English zinc mines cannot compete with American companies, it may not be because English labor assumes too leisurely an attitude while on duty, to quote your editorial, but because English zinc mines do not exist, having been ruined by the action of the British Government in buying Australian zinc concentrate at far above the world price, and selling it to English smelters far below cost. R. T. HANCOCK.

Maracaibo, Venezuela.

Unwatering a Mine Shaft

THE EDITOR:

Sir—I note with pleasure, of course, that my short article on "Unwatering a Mine Shaft," originally in the *Colorado School of Mines Magazine*, was of sufficient interest to appear in your issue of Aug. 4. I would suggest, however, that what appears to me as probably the most important feature of the job was overlooked in your synopsis, namely the financial and time data. These were: Total water raised, 76,000 gallons; time required, 34 hours; gasoline used, 23 gallons. H. R. VAN WAGENEN.

Los Angeles.

Gold in Keewatin and the Mining Possibilities of Western Ontario

THE EDITOR:

Sir—I have just been reading with great interest "Gold in Keewatin," by Mr. Bramble, in your issue of Sept. 8. All that he says regarding the geology and possibilities of that district is true, as I chance to know, having recently returned from a month spent inspecting a score of the old properties, some of which I was familiar with twenty-five years ago.

The developments in eastern Ontario have taught us much about the possibilities of the pre-Cambrian, where it is auriferous at all, and there is a vast area in western Ontario containing showings which would start a stampede if they had never been heard of before by interested parties.

I am wondering if Mr. Bramble is familiar with Eugene Coste's priceless report on the Lake of the Woods, printed in the Report of the Dominion Survey for 1884, in which he refers to one of the old prospects, which has been idle since about that date, in the following words: "But how could a lumber merchant and a gentleman farmer expect to make a success of a mining venture without the advice of a single competent person?" I visited this prospect, and photographed the wreck of the mill, built on the banks of a creek without water in summer. The vein is, as Coste says, rich. But the association of porphyry and schist with the gold-bearing quartz is most interesting.

Buffalo mining interests, which were successful in Cobalt, later were the chief factor in the development of Kirkland Lake and are heavily interested in Porcupine, own two of the most attractive prospects in the Kenora district, and are negotiating for more of them. Buffalo is also heavily interested in the Contact Bay mine, near Dryden, the only mine in the district actually on a producing basis.

Mr. Bramble might have added that the investigator who goes to Kenora with a view to real mining will receive a warm welcome and a charming hospitality which is most delightful. B. J. HATMAKER.

Buffalo, N. Y.

Criticism a Compliment

THE EDITOR:

Sir—A study of the *Transactions* of the Institution of Mining and Metallurgy confirms your comments on "Be Sociable With Your Thoughts" in your issue of Aug. 25. The discussion and the author's reply is often more important than the paper itself. Where the author is writing to announce a new theory or discovery he may be hurt, or enlightened, when criticism is destructive, but when the writer relates experience, difficulties, or seeks to help others, he is amply rewarded by the encouragement he receives in the discussion and correspondence that follow.

If the criticism is pungent and destructive, if it clamors for more detail, if it objects to arrangement or doubts the conclusions arrived at, the author has ample opportunity to correct, enlarge, and clarify in his reply and correspondence. The knowledge that he has helped others far outweighs any irritation that may arise from criticism that in many cases is due to a misunderstanding that may be the author's fault. Expressions of regret that more detail is not given or that the author has not done himself justice are, in a way, a compliment and can be answered.

A writer who will take the trouble to prepare a paper will always respond to appeals for further information and explanation where they can be given or serve a useful purpose.

The author of the paper criticized so pungently in the extracts you quote in your editorial is assured that the valuable criticism, the exchange of ideas, the good feeling in the profession, and, above all, the thanks of any who may have been helped, should amply compensate for the labor of writing and hopes that criticism and discussion will be increased. It really helps others, and that is what counts in these struggling times.

London, England. W. A. HEYWOOD.

The Most Efficient Grinding Medium

THE EDITOR:

Sir—In an experimental test upon various iron ores as to what medium or method is the most efficient we have arrived at certain conclusions. In grinding in conical mills, instead of the pulverizers being made round we believe their form should be conical, including both large and small sizes, with oval and pointed ends. In cylindrical mills double pyramidal media proved more efficient than did the regular triangular type. The cubical type are in a class by themselves when it comes to crushing very hard and abrasive material.

For fine grinding the double-ended pyramidal type proved the most efficient, especially so when retained by an encircling cage to prevent them taking a sideward motion. The least efficient grinder of all is the perfectly spherical ball, including large as well as small.

In the rod mill another characteristic point was brought to view—namely, that the shorter the length commensurate with the weight and hardness of the ore, the greater the efficiency over using rods in one length.

In practical language this sounds heretical except that experimental processes are not to be relied upon in actual practice or otherwise they would have been adopted long years ago. WILLIAM POLICE.

Ramseur, N. C.

Shapes of Grinding Balls

THE EDITOR:

Sir—The discussion on "Peculiar Shapes of Grinding Balls" in the *Journal-Press* of Sept. 8 is of particular interest to me, as I have noted the same phenomena in a great many places. What particularly drew my attention was the flattened shape of the spheres. Personally I believe that this flattened shape is due to a skidding or shearing action of the charge within a mill upon itself or rather one part of the charge upon another. This undoubtedly produces the ideal triturating motion, which is far more useful for fine grinding than either the rolling action of steel balls or rods. The ball mill gives a point contact, the rod mill a line contact, whereas the ideal grinding would be performed by a series of mullers that are used on a bucking board, as the arc of contact between the muller and the board is far smaller than that between a series of steel balls or steel rods within a mill.

Undoubtedly a closer study of the shapes of grinding balls as a result of this might bring about adoption of some shape other than spheres or rods. The subject is certainly one that is worthy of attention.

New York. ARTHUR E. FEUST.

Describing a Small Mine

THE EDITOR:

Sir—Referring to the article, "Describing a Small Mine," by L. Webster Wickes, in the issue of Sept. 1, and after perusing the details which the average prospector owner is asked to supply, I would suggest that Mr. Wickes reduce his questionnaire to the following form:

"Send complete, detailed report made by a competent mine geologist, also report by a practical, mine-operating engineer," or, if the data available through geological surveys and technical publications suggest favorable surroundings and the story reads reasonably, as originally presented, that the mine be visited, in person, and sufficient time given to secure information, not only as to width and assay value of sampled sections of the deposit, but something of the surroundings, the geology, the history of the camp and other mines and of what has been taken out, subjects of the utmost value in forming an opinion as to the merits of any presentation. L. S. ROPES.

Helena, Mont.

Approval From Alaska

THE EDITOR:

Sir—I read with much appreciation in a recent issue of the *Journal-Press* the article on the Buck Passer Mine. It is honestly the best article that I have read in quite a while. I should think that some of our mining men would take a hint. In some mines today there are more men in the office than there are underground; we have more loafers than workers. Can it be possible that our present form of operation will undergo a change? It seems to be pretty near time for it. I should like to know where the aforementioned Buck Passer Mine is located. P. H. HANSEN.

Wassilla, Alaska.

[We regret that we are unable to tell just where the Buck Passer Mine described in the article in our June 2 issue is situated. There are several of them.—EDITOR.]

Consultation

Is Platinum Soluble in Cyanide?

Substantial evidence that platinum is soluble in cyanide solution is given in the following informing and helpful letter from Edward R. Haggin, of Culiacan, Sinaloa, Mexico, who speaks from practical experience:

"In your issue of July 21 under the head of 'Consultation' we note the question as to whether or not platinum is soluble in cyanide. For the information of yourselves and readers, we wish to say that recently the question arose with us as to how much platinum was contained in our cyanide bars. All qualitative tests showed that platinum was present. We submitted samples to the Irvington Smelting & Refining Works, of Irvington, N. J., and they reported traces of platinum both in the amalgam bullion and in the cyanide bullion. Subsequent shipment of straight cyanide bullion made to the above firm was liquidated at the rate of 0.09 points of platinum contained per 1,000. Messrs. Ledoux & Co., of your city, gave us 0.62 points of platinum on a later shipment of the same bullion.

"Therefore we will take the liberty of stating that 'platinum is soluble in cyanide,' but to the exact extent, we are as yet not able to state.

"This bullion is being produced at the Mautal Gold Mines, belonging to our firm. MILWARD & HAGGIN,

"Sinaloa, Mexico. Edw. R. Haggin."

A Fair Value for Copper

"As a shareholder in the —— Copper Co. of Arizona, I have been trying to get some information from them regarding their operations. They have given me copy of an assay report made in July, 1921, by the —— Laboratory, Boston, Mass., which shows the gold, silver, and copper in several specimens of ore. It also estimates the average value per ton at about $8s, and in doing this uses the price of copper at 20c. per lb., although the market price at the time the report was made was 12c. per lb.

"Upon referring to the copper company for further information, I was told that it is not correct to use the present price of copper, but that the accepted statistical method is to take the average price of copper for the past 50 years. This seems an unusual practice, and I ask you to kindly advise me if it is correct; also, if you have it available, will you tell me the average price of copper for the last fifty years.

"Further, is it not usual for an assay report to show more detail than just the gold, silver, and copper? I have understood that it is important to indicate the amount of iron at least. The company informed me that no complete assay report in advance is possible in a mining enterprise like theirs, and since they claim to have been developing the property for four years, I am wondering if you can advise me at what stage one should expect this information.

"You kindly favored me with some information in April last, which started me to looking up this company, and I would thank you for any further assistance you may give me."

It seems fair to take a price of copper near its present level as a basis for making future calculations. Many engineers deliberately and conservatively use abnormally low prices for copper in estimating what profits can be made. Without a doubt there is going to be a large demand for copper in the next few years, but, on the other hand, the development of enormous deposits of low-grade ores, which can be mined profitably at low prices, is likely to prevent the market from establishing itself at an unusually high average. Of course one man's guess is as good as that of another, or at least almost as good. The average price of copper from 1872 to 1888 was 20.7c.; from 1882 to 1892, 13.5c.; from 1892 to 1902, 12.8c.; from 1902 to 1912, 15.2c., and from 1912 to 1922, 19.2c. The average for the fifty-year period is 16.3c. This, as you will see, is about three cents above the present market price, and of course copper may easily sell at that figure by the time the copper company begins shipping its ore to a reduction works.

It is important for an analysis to state the other substances that are present besides gold, silver, and copper. Details respecting the amounts of sulphur, silica, iron, and aluminum, together with the amounts of any interfering metals that may be present, are of particular value in determining the suitability of an ore to a smelting process.

However, the copper company is right in saying that no complete assay report in advance is possible in an undeveloped mining enterprise. After four years' work, however, the company should be able to have a pretty good idea as to the analysis of the ore that it proposes to ship.

Black Sand Concentrator

"Your books have enabled me to speak with a confidence that is surprising to some of the old-time miners, and I find mining so interesting that I wish I had the opportunity to go to school, which I will if I sell my prospects.

"I would ask your consulting department two questions of considerable importance to my future actions, namely:

"Can pay dirt be worked that is too far from water, and high and dry up on a mountain bench? Dirt consists of what I believe to be a heavy deposit of black sand, probably an old back-beach terrace like that near Nome, Alaska.

"Is there some machine that could work this without water?

"My second question, in a way, concerns the first.

"Recently a 'salesman' was looking for 'dry' pay dirt so that his company could use a machine that operated on this principle:

"A tank containing hot lead was installed on a dredge. Dirt was conveyed up above the tank and screened, and the screenings were forced into the hot lead with spirals, the theory being that specific gravity would force all the lighter material to the top and the gold and platinum would sink.

"Of course, I refused to purchase stock in such an experiment and I built a very small model and failed to make it work.

"He, the salesman, showed laboratory tests and technical data, but no model. He spoke of a certain degree of heat. Possibly I never attained that, and though I don't expect your consulting department to try it, perhaps you can tell me in a few words if there is merit in the theory."

Our correspondent does not state whether he has made any effort to learn the extent of his deposit: whether it contains metal in sufficient quantity to make development attractive. That should be the first endeavor. If it contains precious metals in sufficient quantities to make the deposit of commercial importance, we would suggest that he get in touch with some of the manufacturers of dry concentrating machinery, whose names will be supplied upon request and whose machinery might be applicable.

We would not place too much confidence in any of the new schemes for working dry sands, which depend upon some elaborate idea such as the one mentioned above in which the specific gravity of lead, gold, and platinum are expected to play an important part. The specific gravity of these three metals is close enough together to make the method impracticable, to say nothing of its costly nature.

Recent Technical Publications

Reviews, Abstracts, and References

De Launay on Applied Geology

De Launay, L. Géologie et Minéralogie appliquées a l'art de l'ingénieur. 8vo, pp. 418. J. B. Bailliere et Fils, Paris, 1922. 40 francs.

Le Launay, L. Où en est la Géologie. 12mo, 213 pp. Gauthier-Villiers et Cie., Paris, 1923. 12 francs.

Two new books by Professor De Launay, which have appeared in the past year or so, deal more or less directly with the applications of geology to modern industrial life. One, that first cited above, does so very directly and completely; but the second, though less explicitly economic, contains in two out of its six chapters important discussions of certain specific applications of geology.

In his "Geology and Mineralogy Applied to the Art of the Engineer," De Launay has attempted, with more success than most of his predecessors, to combine a summary text on geology and mineralogy in general with a discussion of the more purely economic features of the subject. For a complete treatise, designed for separate use by persons who have had no reason to study either science earlier, there is doubtless an argument in favor of this mode of treatment. It does make it possible for the unlearned reader to gather his knowledge of geology in general and of applied geology in particular from one single volume; as against this, the combination implies a relative cramping of the space that may be devoted to applied geology itself. The choice is, after all, entirely dependent upon what sort of preliminary scientific training the particular reader has had. It is in the last degree improbable that any French engineer, graduated necessarily from either the School of Mines or St. Cyr, has done so without at least an introductory course in pure geology. So to this extent the inclusion of such matter in a text on applied geology seems unnecessary.

The effect is, that out of 397 pages of actual text, the first 239 are devoted to mineralogy, petrography, paleontology, stratigraphy and orogeny—all very worthy subjects and, in this instance, clearly treated—but subjects better treated elsewhere. The remaining 158 pages are devoted to applied geology proper.

Four sections comprise the economic portion of the book. These consider, in turn, the methods of map-making and the utilization of geologic maps, the origin and occurrence of mineral deposits, the application of geology to certain specific types of civil engineering works, and—in a separate chapter—the occurrence and search for underground water supplies.

The section on mineral deposits is necessarily compressed, but, as might have been expected from the author, very clearly summarized, so that in total it affords as useful a discussion as the space permits. The ninth chapter is by far the most original and useful of the book, for in it De Launay takes up the applications of geology to definite engineering problems—the location of dams, of roads, or railroads, of canals, of tunnels. The final chapter, on underground water supplies, is the most detailed of the economic sections, a proportion which is justified by the high importance attaching to such supplies both in France and in the North African colonies.

The second and later book noted above is, as the title suggests, an attempt to summarize in at least semi-popular fashion, the position which geology has attained, the problems it now faces, and the probabilities as to the future progress of the science. That is, of course, an interesting study, but its inclusion in this review is due to the fact that its final two chapters are devoted somewhat unexpectedly to (1) a discussion of the origin of metallic ores and (2) "the new methods for searching coal, petroleum and metallic minerals." This last is far broader than its title implies. For while it does discuss the various magnetic, electric and other prospecting methods of those types, it also gives, in some thirty pages, the clearest and most satisfactory description of the extent to which the geologist can aid in the search for coal and petroleum, the limitations upon such aid, and the degree to which it can be relied on as regards either precision or general accuracy. I do not know of any American or British text which attempts to explain these matters to the layman. And yet, as all of us know by sad experience, they are matters which are almost always misunderstood.

If the author were an ordinary college professor, it might be necessary to add that both of the books are thoroughly sound in doctrine, that they are based on a broad working experience, and that they contain much matter that is clearly original. If the author were not French, it might also be necessary to add that both books are written clearly and concisely. Since the author is in fact De Launay, we may easily take all of these things for granted.

EDWIN C. ECKEL.

Canadian Mining—The Aug. 17 issue of the *Canadian Mining Journal* (Gardenvale, Quebec; price 15c.) is devoted to articles descriptive of the mines, mills, and smelters which were visited by the A.I.M.E. in the recent trip into northern Ontario and Quebec. An especially good review is given of the Quebec asbestos industry, the methods of mining and milling being described.

Transvaal Mining—The Thirty-third Annual Report of the Transvaal Chamber of Mines, for 1922, has been received. It is a book of 288 pages, containing the usual statistics and information concerning the industry. Copies may be obtained from the Transvaal Chamber of Mines, P. O. Box 809, Johannesburg, South Africa.

Carbon Tetrachloride as a Fire Extinguisher—U. S. Bureau of Mines *Reports of Investigations*, Serial No. 2,499, 16 pages, obtainable on request, gives the results of experiments on the use of carbon tetrachloride as an extinguisher of electric fires. It is declared to be the most effective and satisfactory extinguisher that can be used, but the fumes may be poisonous in confined spaces. This is the substance that is used in the Pyrene fire extinguisher and in Carbona cleaning fluid.

Electrical Prospecting—The results obtained by the Schlumberger method of electrical prospecting are discussed by Sherwin F. Kelly in a 9-page paper prepared for the A.I.M.E. The paper describes the theory and technique, and also the field work carried on by the author in Manitoba and Saskatchewan. Former discussions of the work have appeared in this journal. The paper is obtainable from the Secretary of the A.I.M.E., 29 West 39th St., New York City.

South African Petroleum—The July issue of the *South African Journal of Industries* (451 Market St., Pretoria; price 6d.) is essentially an oil-shale number, and deals with the possibility of an oil-shale industry for the Union. One of the two principal articles gives a résumé of the present knowledge of the oil-yielding rocks in the country, and the other describes retorting and refining processes that might be applied to the extraction of petroleum. There are apparently large deposits of oil shale of good quality in the Union.

Hydro-electric Development in Canada—The gold and silver mines of northern Ontario depend almost exclusively upon hydro-electric power for operation and a shortage of such power has hindered them many times. Fortunately there is plenty of water power available, but the mines have grown faster than it can be developed. Bulletin 46 of the Ontario Department of Mines (23 pages; obtainable on request to the Minister of Mines, Toronto) is a brief illustrated review of hydro-electric installations in that district.

United States Geography—Bulletin 689 of the U. S. Geological Survey, Washington, D. C. (234 pages; obtainable on request), is a history of the "Boundaries, Areas, Geographic Centers, and Altitudes of the United States and the Several States." Much information of great interest to students of history is given, and there is a large reproduction of the Mitchell map of what is now the eastern section of the United States and Canada, published in 1755.

SOCIETIES, ADDRESSES, AND REPORTS

Wages and Cost of Living Still High

Workingman Has Advantage, However, Report of National Industrial Conference Board Shows

SUSTAINED HIGH LEVELS both in the cost of living and, to a greater degree, in the earnings of the American workingman are revealed in two research reports issued on Sept. 24 by the National Industrial Conference Board, of 10 East 39th St., New York. The reports cast new light on the trend both of what it costs the average American family to live and what the head of the family has left in his pay envelope when the bills are paid. These trends, which have been the cause of considerable research by economists during the last six months, are summarized by the board in its reports, and studied in detail. The study on wages, hours, and employment in American industries is the first of its kind the board has completed since the first of the year, and the report on cost of living changes is the first since last March. They are issued simultaneously.

"Real" Earnings Now Higher

At the same time it has been made known that a great part of the session of the board on Sept. 20 in the Hotel Astor in New York was devoted to consideration of the present wage and cost of living situation. In brief, the wage situation reflects at present a higher level for "real" earnings, as weighted with what these earnings will buy, than at any time since before the war, not excepting the so-called "peak" period of 1920. The cost of living in July, the latest time when comprehensive figures were available for a survey of this magnitude, was 61.9 per cent above the 1914 level, and this was a decline of 20.8 per cent from the peak of high prices in July, 1920. Most noteworthy were the increases in rents throughout the country. In fact, the rent item in the average family budget in July last was 75 per cent higher, the board's figures show, than in 1914, and even higher than their former peak of 71 per cent in the spring of 1921.

Since March, 1922, there has been a gradual but steady rise in the cost of living of 4.7 per cent to July last. Between March and July of this year the increase was 1.7 per cent.

The same sources were used in the inquiry as in the Conference Board's fifteen preceding cost of living reports since 1914. The retail food price index numbers of the United States Bureau of Labor Statistics were used as a basis for establishing changes in the cost of keeping the family larder filled.

Furthermore, changes in the various budget items were weighted in accordance with the importance of the item in the total budget of families before the war. The combined increase thus obtained shows the rise since 1914. Between March and July this year food prices increased 3.5 per cent and in July they were 47 per cent above the pre-war level, but had declined 33 per cent from the peak of July, 1922. There was a noteworthy difference in the relative increase in the price of food from city to city among the 39 reporting changes in the last nine years. In Washington, with 58 per cent, Chicago and Detroit, 57 per cent each, and Richmond, 56 per cent, the increases were more than twice as great as the smallest advance, in Salt Lake City, of 27 per cent. For the most part the least rise in food prices was noted in the Far West, advances in the East and Middle West being uniformly greater.

In New York the food price increase between 1914 and July last was 53 per cent, one of the highest in the country. In the present year up to July the increase was 5 per cent. Detailed study of the boosts in the costs of various foods shows that the homely but essential potato led the procession with a rise of 147 per cent since 1914.

Since July three years ago decreases have been shown in the food, clothing, and sundries items of the family budget, and increases in shelter, fuel, and light. Between March and July this year only the items of fuel and light showed a decrease, but there was no change in sundries, including amusements and other unclassified expenditures.

Rents Still Increasing

As to rising rents, which give the Conference Board's research experts the greatest cause for comment, it is found that there was an average increase in rents of 3 per cent between March and July this year. It was significant, however, that rent inflation seems to have subsided somewhat in the larger eastern cities, such as Boston, Buffalo, New York, Baltimore, Philadelphia, and Pittsburgh, all of which report either no changes or a small increase. Washington had an increase in this period of between 11 and 20 per cent. In the Middle West, twenty-five cities reported higher rents, while landlords were reducing their bills in six only; in the remainder of the fifty-nine cities reporting in this section no change had occurred. However, rent increases which averaged 100 per cent or more since 1914 were in effect in thirty-two cities. Chicago has been added to this group since last March, and Detroit, Los Angeles, and Milwaukee also report doubled rents.

Clothing 36.3 Per Cent Lower Than in 1920

The average cost of clothing increased less than 1 per cent between March and July this year. Clothing prices in July had declined 39 per cent since March, 1920, when their peak, totaling 177 per cent since pre-war days, was attained. Budget totals worked out by the Conference Board's research staff show that it cost only eight-tenths of 1 per cent more for the average family's clothes in July than it did in March. The decline in the last three years has been 36.3 per cent, and the net increase in the family clothing bill since 1914 was 70 per cent.

Most significant of all, however, is a comparison of the report on the cost of living with the concurrent report on wages, hours, and employment—the first time such a comparison on the basis of the board's authoritative figures has been made possible in nine years. Especially noteworthy is the decided advance in "real" earnings, which establishes the contention of economists that the American workingman is better off today than he ever was before. During the first half of 1923 increased pay and a higher level of hours worked resulted in substantially increased earnings. The comparatively small increase in the cost of living for the same period materially increased weighted or "real" earnings, which reached levels well above those attained during the months of so-called peak wages in 1920. In June the "real" or weighted hourly earnings were 40 per cent above the 1914 level, and the weekly earnings 35 per cent higher.

How the difficulties confronting all wage research agencies have been overcome by the National Industrial Conference Board is detailed in the report as follows:

"Each industry is faced by its peculiar problems of materials, labor, and distribution, with the result that trends in wages, hours, or employment for a given industry are not necessarily representative of industry as a whole. However, by combining data for a number industries, the fluctuations due to peculiarities inherent in individual industries are smoothed out and only the major trends common to the majority remain, forming a composite trend which should reflect basic movements affecting manufacturing industries."

MEN YOU SHOULD KNOW ABOUT

Nelson Dickerman has returned to New York from a trip to Minnesota.

Premier Bracken of Manitoba recently visited the Bingo mine, in the Herb Lake district of the province.

Dr. George Otis Smith, after eleven months' service with the U. S. Coal Commission, has by executive order been reappointed director of the U. S. Geological Survey. The reappointment became effective Sept. 24. The Coal

Dr. George Otis Smith

Commission expired by statutory limitation on Sept. 22. Thus, for one day, after twenty-seven years of continuous public service, Dr. Smith was without official responsibility.

J. W. Sherwin, general manager of the West End and Halifax mines, at Tonopah, is in Tonopah from Oakland.

Paul Wooton, Washington correspondent of the *Journal-Press,* has returned from an extended visit to England and France.

E. S. Larsen has reported at Cambridge, where he will take up his work as professor of petrography at Harvard University.

H. D. Budelman, mine superintendent of the West End and Halifax mines at Tonopah, has returned to Tonopah from a trip to California points.

L. R. Robins, superintendent of the Tonopah Belmont Development Co., has left Tonopah for an extended trip to Colorado and eastern points.

W. Mont Ferry, vice-president and managing director of the Silver King Coalition Mines Co., Salt Lake, Utah, was recently in San Francisco.

L. W. Stephenson arrived at Maracaibo, Venezuela, on Aug. 31. He will make some geological observations in the petroleum region of that country.

R. B. Walthall, chief supervisor, oil and gas division of the State Railroad Commission, left Houston the latter part of August on an inspection tour of the Gulf Coast fields.

John H. McLean, general manager of the Oliver Iron Mining Co., Duluth, Minn., and **John Uno Sebenius,** chief mining engineer, have gone to the Gogebic range for a week.

D. E. McDougall has resigned his position as vice-president of the British Empire Steel Corporation, but will remain a member of the board of directors, in a consulting capacity.

G. F. Loughlin, head of the Mineral Resources branch of the U. S. Geological Survey, is in Michigan, where he is conferring with **B. S. Butler** concerning the continuation of the survey of the Lake Copper district.

Herbert K. Cummings, associate physicist in the Bureau of Standards, Washington, is in a critical condition as the result of injuries sustained in the explosion in the dynamometer laboratory of the Bureau on Sept. 20.

J. E. Spurr and **A. H. Hubbell,** of the staff of the *Journal-Press,* accompanied by **D. E. A. Charlton,** assistant business manager, attended the convention of the American Mining Congress, held in Milwaukee, in the week of Sept. 24-29.

Lee Hager, oil geologist, of Houston, Tex., reported to have been in Tokio when the earthquake occurred, is in San Francisco, according to a wire to his Houston office, recently received. Mr. Hager had been traveling extensively in the East.

H. S. Mulliken, Chief of Division, War Minerals Supply, Department of the Interior, who has been in Chile cooperating with Dr. Bain, Director of the Bureau, in an investigation of the nitrate situation, returned to New York on Sept. 24.

Nelson Littell, formerly second assistant examiner of the U. S. Patent Office, has resigned to engage in the practice of patent law, with offices at 110 East 42d St., New York City. Since August, 1919, Mr. Littell has examined patents in the class of metal founding, Division 3.

Colonel C. H. Birdseye, chief topographer of the U. S. Geological Survey, and his party, who are engaged in a survey of the Colorado River, are believed by Survey officials to be in no danger, despite disquieting rumors to the contrary that have been widely circulated, because of the discovery of the wreckage of a Survey boat that had been carried from its moorings by high water. Colonel Birdseye is thoroughly familiar with the vagaries of the Colorado River, and there is no evidence that the party has met with accident or misfortune.

OBITUARY

Oscar Rohn was killed Sept. 19, while examining the new No. 4 shaft of the East Butte Copper Mining Co., at Butte, Mont., his death resulting from injuries sustained when he was struck by a skip. Although Mr. Rohn made his headquarters in Denver, the principal activities of his company were centered in Butte, which was really his home. This unfortunate accident terminates the career of an extremely competent and notable mining engineer. Oscar Rohn was born in Jackson, Wis., June 27, 1870, and was graduated from the University of Wisconsin in 1895. His first professional work was for the government in Alaskan exploration, where he was asociated with J. E. Spurr's expedition in 1898, and he made an expedition into the Copper River country in 1899. The examination of iron lands in Minnesota next engaged his attention, after which he became manager of the Donora Mining Co., of Duluth. That was in 1902 and 1903. He then established himself as a consulting engineer, and for three years was engaged in independent work. In 1903, he was appointed manager of the Pittsburgh & Montana Mining Co., and in 1906 manager of the East Butte Copper Mining Co., a position he had held ever since. Mr. Rohn's greatest achievement was, perhaps, taking the East Butte holdings, which were leaner than those in the main part of Butte, and rescuing the investment of the stockholders of that company. Under his direction the enterprise was transformed into an efficient, moderate-sized copper producer from a property that had been previously unsuccessfully developed. Oscar Rohn was a member of the A.I.M.E., the Lake Superior Mining Institute, and the Silver Bow and Rocky Mountain clubs.

William Tudor, a practical mining man and artist, died recently at Venice, Italy. He was graduated from Harvard in 1871, and after taking up portrait painting engaged in mining operations in Georgia, Florida, and Alaska. Mr. Tudor devoted some time in 1891 to the study of art and in portrait painting in Paris. A letter from him, just received, appears on page 552 of this issue.

James Ewan Robertson died recently at his home in El Paso, Tex. About twenty years ago Mr. Robertson went to El Paso, where he was connected with the El Paso smelter, later entering business for himself. At the time of his death he was senior partner of James E. Robertson & Co., of El Paso.

Logan L. Lauer, assistant physicist; **Urban J. Cook,** machinist; **Stephen M. Lee,** mechanical engineer; and **J. E. Kendig,** assistant electrical engineer, all employed in the dynamometer laboratory of the Bureau of Standards, at Washington, were killed by an explosion of gasoline and an air mixture in the altitude chamber on Sept 20.

Thomas Murphy, prospector, the discoverer of the Goudreau gold mine and other properties in the same area, died at Sault Ste. Marie, Ont., on Sept. 17, after a few days' illness. He was born in New York and was thirty-six years of age.

THE MINING NEWS

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Leading Events

RETURNING from London, the Washington correspondent of the *Journal-Press* suggests that American silver producers should have a representative at the daily conference of the bullion brokers who "fix" the current quotations for silver. He was refused permission to observe the deliberations for one day.

Anaconda has opened an ore-purchasing office at Wallace, Idaho, in order to augment purchases of zinc ore and concentrate.

The Asbestos Corporation of Canada declares that "senseless competition" among the producers is injuring the asbestos-mining industry.

The absorption of the Peñoles company of Mexico by the American Metal Co. seems assured.

The output of zinc concentrate in the Joplin-Miami district has increased to 12,000 tons per week in spite of a five-day operating week.

The Ahmeek Mining Co., in Michigan, is now producing copper at its maximum war-time rate.

The construction of a milling plant has been decided upon by the Castle Tretheway Co. at Gowganda, in northern Ontario.

A new vein of rich copper-silver ore has been cut by the Magma Copper Co. of Arizona, in territory hitherto unproductive.

Reconstruction at the Hecla mine, in the Coeur d'Alene, should permit production by Jan. 1.

Plans are under way for restarting the San Andres smelter in Durango, Mexico.

The Federal M. & S. Co. has bonded the Broken Hill property, a new bonanza near the Idaho-Montana line.

The Noranda Mines Co. has made an encouraging report on its properties in Rouyn Township, in northwestern Quebec.

Noranda Makes Encouraging Report on Rouyn, Que., Gold Outlook

Excellent Assays Over Good Widths in New District in Northwest Part of Province—Shaft Planned

An interim report has been sent to shareholders of the Noranda Mines, Ltd., which controls a large acreage in the new Rouyn gold district of northwestern Quebec. The report states that a new and important discovery has been made on one of the properties. The gold is found in an area of crushed and brecciated lava flows, in which the brecciated lava has been cemented and replaced by quartz, pyrite, and rusty carbonates. The area has a length of about 800 ft. and a width of 300 ft., and visible gold is scattered everywhere.

Surface trenching and sampling done to date indicate that ore of commercial grade will be confined to the fracture zones where the alteration of the lava has been greatest. One trench across a portion of the orebody has disclosed two separate sections, the first one giving an average of $9 across 8 ft., and the second $15 across 15.6 ft. These two sections are separated by 67 ft. of material assaying $2.25 a ton, which gives an average of $5 across a total width of 90 ft. About 50 ft. to the north a parallel trench showed two sections, of which one went $4.80 across 11 ft. and the other $11 across 25 ft.

It is stated that results of preliminary exploration have been so satisfactory that it has been decided to diamond drill and sink a shaft at once. It is understood that, since the report was issued, further trenches have been cut, which showed a continuation of the values. These operations are of considerable importance, as the Rouyn district is new, and before this discovery results throughout that section had not been particularly encouraging.

4,000 A. S. & R. Employees Strike in Mexico

FOUR THOUSAND mine and smelter workers employed by the American Smelting & Refining Co. went on strike at Chihauhua Mexico, on Sept. 19, according to press dispatches. The action was in compliance with an order issued by labor leaders. Officials of the company blame labor agitators for the trouble.

Differences between the workmen and the company were settled a month ago, but the agitators, the officials say, issued additional demands which the company refused to meet.

Anaconda Bids for More Zinc Business in the Coeur d'Alene

Establishes Ore-purchasing Office—Great Falls Electrolytic Plant Needs More Ore

The Anaconda Copper Mining Co. has established an office in Wallace, Idaho, with W. M. Whitecotton in charge as representative of the company in the Cœur d'Alene district. A few weeks ago Anaconda closed a contract for the purchase of the zinc output of the Success Mining Co. and that of the Federal Mining & Smelting Co. (Morning mine). A representative of the company subsequently made a survey of the zinc possibilities of the district, and this is now followed by sending a permanent representative of the company to make headquarters in the Cœur d'Alene.

L. R. Margetts, superintendent of the Washoe sampler of the Anaconda company at Butte, accompanied Mr. Whitecotton to Wallace, and stated that it would be the policy of Anaconda to encourage in every way possible the production of zinc in the Coeur d'Alene and that the plant in Great Falls was in position to handle any amount offered. Mr. Whitecotton is a metallurgical engineer, and has been connected with the Great Falls electrolytic zinc plant for some years.

British Zinc Specialist Predicts Increased Foreign Buying in America

Europe Will Take 4,000 to 7,000 Tons Monthly—Argentina, France, and Japan Will Be Final Consumers—Encouragement for Domestic Miners

ACCORDING to A. J. M. Sharpe, foreign correspondent for the American Zinc Institute, dealers recognize a shortage of slab zinc in the London market; this he believes will become aggravated in the months just ahead. The relief naturally will come from increased imports from the United States.

The tonnage of zinc that Europe will have to draw from this country will range from 4,000 to 7,000 tons a month, according to Mr. Sharpe. Summing up available supplies, he says that Germany, including Silesia, is certain of 11,000 tons of slab zinc a month, but the major part is immobilized in the Ruhr and can, therefore, be disregarded so far as available stocks are concerned. Australia is producing more than 40,000 tons of electrolytic zinc a year, the bulk of which has been going to Japan, and shipments in that direction will increase as a result of the earthquake. The combined annual output of British smelters is 30,000 tons a year.

World zinc stocks as of Sept. 1 he estimates as follows:

Country	Metric Tons
United States	24,000
Germany and Poland	10,500
Canada	750
Britain	2,100
Belgium	1,900
France	750
Scandinavia	400
Australia (including unsold shipments afloat)	1,250
Other countries	1,000
Total	42,650

"British consumers are not covered far ahead," Mr. Sharpe says, "and, with growing knowledge that the deficiency in future supplies can be met only by imports from America, dealers may be expected to contract with United States producers more heavily. Indian demand for galvanized sheets has quieted down, but stocks there are lower than at any time in two years, and it is certain that a fresh buying wave will set in soon. Meanwhile, Australasia and Argentina have been ordering and British galvanizers are fully booked until end of October and in some cases until later in the year."

Mr. Sharpe says Belgian smelters are operating on a basis of 12,000 tons a month and that England, instead of getting from 3,000 to 4,000 tons a month from this source, will be lucky if she gets more than 2,000 tons after November, as Belgian rolling mills will use large quantities to meet an Argentine order for 20,000 tons of sheet zinc to be used to combat the locust pest. French demand for sheet zinc also is increasing, and rolling mills of both Belgium and France are expected to operate at full capacity for some time to come.

On top of the demand already enumerated comes the Japanese disaster. Rebuilding of Tokio and Yokohama will call for immense quantities of metal. "So far as zinc is concerned," says Mr. Sharpe, "it will be remembered that the Japanese Government imposed a new building law a year or so ago requiring shingle roofs to be replaced by metal or other substantial fabric. It is on this account that Japan has been buying slab zinc so freely for the last year, during which period she has also imported very large quantities of black sheets from Britain to galvanize in her own country. For reconstruction purposes, large imports of galvanized sheets will be made, as the domestic galvanizers will be busy with requirements of districts outside of the devastated area."

San Andres Smelter in Durango Will Be Restarted

Two Furnaces Ready To Blow In—Various Mines Are Shipping Lead-Silver Ore

La Fundadora de la Sierra, a company composed largely of capital from Torreon, Lerdo, and vicinity, in Mexico, has completed the remodeling and enlargement of the old smelter of the San Andres Mining & Smelting Co., at San Andres, State of Durango. The plant has been idle for about eighteen years and was badly wrecked during the revolution. In former years it was operated by steam power, but the new owners have installed a modern hydroelectric plant and are utilizing waterpower exclusively.

Two furnaces are now ready for operation—one of 100 tons' daily capacity and the other of 300 tons. Ore is being purchased from the various mines of the San Andres district, and several hundred tons are now bedded at the patio of the smelter. The ores are principally silver-lead, some of them assaying as high as 500 oz. silver and 60 per cent lead. A number of the mines owned by native miners have resumed after an idleness of a number of years.

The San Andres Mining Co., which formerly owned the smelter, retains its mining properties, and engineers have left Durango city to again open them. These will furnish a bulk of the ore for the smelter.

The reconstruction of the smelter was in charge of Oliver W. Krull and George Stinson, who will also direct the operations. They have acquired about 100,000 acres of land around the works, from which an abundance of timber is available for burning charcoal and for supplying wood fuel for smelter operation.

Magma Copper Drills Good Ore in New Area

A NEW ORE STRIKE of importance has been reported at the mine of Magma Copper Co. at Superior, Ariz., where diamond-drill development is in progress. One hole is reported to have passed through 1½ ft. of ore that assayed 12 per cent copper and 21 oz. silver, and about 100 ft. farther another favorable assay was obtained from the same hole. This discovery is in an area that has heretofore proved unproductive, and a larger program of development is now being planned.

"Senseless Competition" Causes Dividend Cut by Asbestos Corporation

Canadian Company Blames Neighboring Producers for Low Prices—Rhodesia Also Factor

The directors of the Asbestos Corporation of Canada, Ltd., have reduced the dividend rate on the preferred stock from 7 per cent to 6 per cent and on the common stock from 6 per cent to 4 per cent. A statement by an official of the company says:

"Shipments of asbestos have shown an increase this year over last. The prices, however, have been considerably reduced, owing to the senseless competition among the Canadian companies. There has also been a falling off in the demand for the company's higher grades, owing to some extent to Rhodesian competition, as well as the unsettled condition of affairs in Europe. In addition to this, the company's production has suffered through the destruction by fire of the King's mine mill.

"These factors have affected the company's profits to an extent that will preclude the directors from continuing the dividends at the present rate for the balance of this year. These dividends might have been continued by assistance from the past surplus earnings of the company, which the directors have carefully conserved from year to year, but owing to the stipulation contained in the bylaws of the company under which the various securities were originally issued, to the effect that dividends can only be declared out of the earnings of the current year, the directors have not the power to make use of any previous surplus earnings to make up any shortage of a current year.

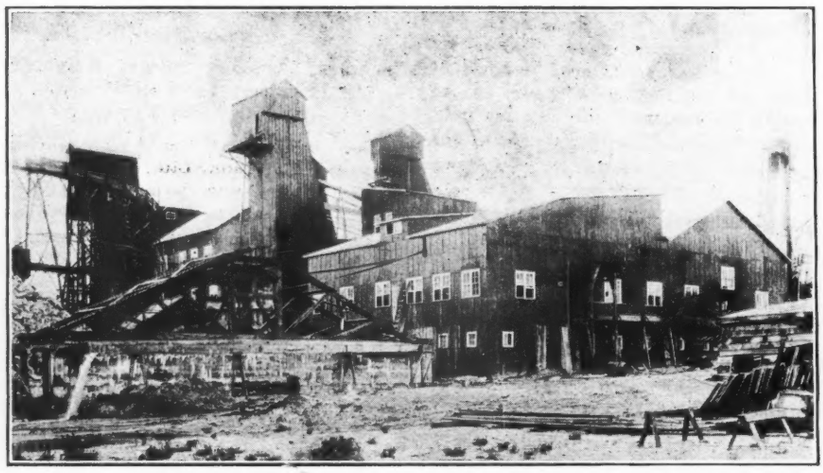
"The company is, however, in a strong financial condition, practically no change having taken place in this respect since the balance sheet submitted at the close of last year, and is, therefore, in excellent position to meet competitive rates until such time as the other mining companies change their attitude.

"It is anticipated the new mill at the King's mine will be completed and in operation by the first of the year."

Joplin-Miami Zinc Output Grows as Prices Climb

Five-day Week Adhered To, But New Producers Have Started Plants—Weekly Output 12,000 Tons

Production of zinc concentrate in the Joplin-Miami district has advanced from about 8,750 tons about the first of July to about 12,000 tons, and this despite the fact that the curtailment program as entered into by a large proportion of the mines is being adhered to. The increase is mostly due to the starting up of mines that closed down some months ago, before the curtailment program was initiated, and they were not able to operate at a profit with ore prices under $35 a ton. The producers who have gone to a five-day week and eliminated night shifts are well satisfied with the outcome, and some of them indicate they will remain on this basis. They claim much better efficiency from both men and mills on this basis. The extra day gives opportunity for keeping the mill in good condition, while the payrolls show there is little labor turnover under the new plan. Before, there were always many men who would work five days a week and lay off. Some superintendents state they are making three-fourths as much concentrate with the five-day, single-shift plan as they made with the six-day program with night shifts.



Concentrator of the Golden Rod Mining & Smelting Co., at Picher, Okla.

Castle-Trethewey Will Sell Preferred Stock to Build Mill

It is announced that the Castle-Trethewey company, operating at Gowganda, in northern Ontario, will proceed immediately with the erection of a mill. Funds to provide for this construction and to finance the property until the producing stage is reached will be provided by the sale of $200,000 of 7 per cent preferred stock, which will be offered to shareholders at 80c. These shares will be redeemable at any time.

Ore reserves stand at 1,163,000 oz., which does not include the vein recently encountered.

Tonopah Divide Will Disburse $101,480 Dividend Sept. 23

Alto Divide Commences Development of a Good Showing on the 600 Level—Bullion Shipments Decline

The directors of the Tonopah Divide Mining Co. declared a 10c. dividend on Sept. 10, payable to stockholders of record Sept. 23. This is the second dividend from the Tonopah Divide, and makes a total of 20c. per share to date, or a gross of $202,960. The company is in first-class financial condition, and should have approximately $375,000 in the treasury after paying dividend No. 2. Earnings are not now at the same rate as during the first half of the year, amounting during the first six months of 1923 to over $200,000, due to depleted ore reserves and drop in the price of silver. However, regular shipments are being made to the West End mill at Tonopah and extensive development work is being carried on on several levels.

The Alto Divide is one of the few Divide district companies which has been able to continue operations through the "hard times." This company has sunk its shaft to the 600 level, and crosscutting and drifting is now being done on this level, with encouraging results. Previous work has been confined to the 400 level, on which several thousand feet of development work was accomplished. Values were low and irregular, and oreshoots are small on the 400 level, but showings in shallow winzes indicated the possibility of an improvement with depth, and the shaft therefore was sunk to the 600 level. What is known as the north-south vein has already been cut and a drift started on it, the vein showing from 12 to 18 in. wide and averages better than $12 per ton, principal values being in gold.

August bullion shipments from Tonopah totaled $289,460, compared with about $600,000 during early months of the year. The Tonopah Extension shipped bullion valued at $148,500, the West End $93,360, and the Tonopah Mining Co. $47,600.

Federal M. & S. Co. Bonds New Bonanza Near Idaho-Montana Line

THE Federal Mining & Smelting Co. has taken an option on control of the Broken Hill property, a comparatively recent discovery in Sanders County, Mont., just over the Idaho state line north of the Coeur d'Alene district. The discovery of the Broken Hill created quite a sensation, lead-silver and zinc ore being found practically on the surface, and its subsequent development to a depth of 250 ft. by a crosscut tunnel has disclosed a remarkably fine showing of ore.

Much of the Broken Hill stock, possibly a majority, is held in the Coeur d'Alene district. The terms of the deal with the Federal have not been made public. The Federal company has taken possession of the property and is proceeding with development.

Absorption of Penoles by American Metal Co. Seems Assured

Ten Pesos and One American Metal Share Offered for Two Shares of Penoles

The American Metal Co., already owning 60 per cent of the shares of Compania Minera de Penoles, has offered to exchange one share of American Metal and 10 pesos in cash for each two shares of Penoles. It is understood that the offer has grown out of the impossibility of creating as steady and active a market for Penoles shares in Mexico City as many of the Penoles shareholders have desired.

Pledges given to the American Metal Co. by larger stockholders in Penoles prior to announcement of the plan practically assure that sufficient stock will be sent in to make the offer binding, the proposition being that at least 60,000 shares must be offered in exchange.

The merging of the Penoles company completely with American Metal may help reduce operating expenses and make a more compact organization.

The offer is good until noon, Dec. 5. Stock certificates of American Metal plus the cash payment of $5 in gold, if the stock is delivered in New York City, will be ready for the exchange Dec. 31, 1923.

Penoles stock delivered prior to Nov. 1, 1923, will be entitled to quarterly dividend, payable on the shares of American Metal Co., Dec. 1, 1923, to stock of record Nov. 17, and Penoles stock delivered after Nov. 1, but prior to noon, Dec. 5, will participate in the quarterly dividend payable on the shares of the parent company March 1, 1924, to stockholders of record Feb. 16, 1924.

The Penoles company owns a large number of mining properties situated in Durango, Nuevo Leon, and Coahuila, and a smelter at Torreon.

Miners Steal Drilling Machines in Arizona Mines

THREE men have been arrested in the Bisbee mining district in Arizona, charged with having stolen "plugger" drilling machines from the Copper Queen mine. It is alleged that it is the practice of the thieves to steal light machines from the local mines and then sell them to lessees that are working the mines of the near-by districts. It is not very difficult to eradicate identifying marks put upon the machines by the manufacturers.

Lordsburg, N. M., Mines Ship Steadily to Arizona Smelters

Bonney and "85" Mines Lead—Anita Copper Co. Plans to Develop Old Nelly Bly Property

Ore shipments from the Lordsburg district in New Mexico for the month of July amounted to 9,144 tons. For the month of August shipments were 8,154 tons. The "85" mine and the Bonney mine were the principal producers, the output going to the smelters at Douglas, Ariz.

The Bonney mine continues to ship good copper ore. During July these shipments amounted to 135 tons and during August to 175 tons. This ore runs well in gold and silver, a car of 47½ tons shipped Aug. 4 ran 0.88 oz. of gold, 18.24 oz. of silver, and 7.83 per cent copper, the net smelter returns being $1,724.78. These ores are being taken from No. 1 shaft between the 205 and 325 levels.

The "85" mine is making improvements preparatory to doing development work. A change-house with individual lockers and shower baths is being installed and a sorting belt and new ore bins are being built at an expense of about $10,000. It is reported that diamond-drill holes have been sunk 450 ft. below the lowest present working level, 1,350 ft., making the total depth of hole 1,800 ft. Fine ore was encountered in this work, and it is the intention to sink the main shaft to a depth of 2,000 ft. at an early date. This will mean about 600 ft. of sinking below the bottom of the present shaft which is 1,420 ft.

The Nelly Bly mine, at old Liedendorf, eight miles south of town, has been taken over under a lease and bond by the Anita Copper Co., of Lordsburg, which is also operating the old Octo copper property. Work upon the Bly, which has been idle for many years, will be started at once by the new owners, and machinery for that purpose has been moved from the Anita works. The Bly was opened to a depth of 400 ft. at one time, but has been badly handled by leasers since then, and much work will be required to put it in condition for operation. The property was owned by the Susquehana Copper Co., in which Pennsylvania capitalists are interested.

News from Washington

By PAUL WOOTON
Special Correspondent

London Bullion Brokers Exclude "Journal-Press" Correspondent From Daily Silver Confab

Efforts of Silver Producers Held in Contempt by British—No Evidence That There Is "Manipulation" in Price-fixing Procedure, However

Note—Mr. Wooton has just returned from England and France, where he covered several assignments for the "Journal-Press."—EDITOR.

THE four men who meet in London each day to fix the price of silver are entirely willing, I am assured, to have a representative of the producers meet with them. At present they assemble behind closed doors. There have been times when persons have been admitted, but it is not the practice. For a time a London representative of the American Smelting & Refining Co. sat with the brokers.

In conversation with H. L. Baggallay and Benjamin White, two of the men who sit on the committee, I asked why the daily meeting is a star-chamber proceeding, in view of their protestations that any manipulation is impossible. Mr. White could see no advantage in fitting the room with a gallery—an addition which he thought would be necessary, as the admission of one outsider would mean that the privilege could be denied to no one. Mr. Baggallay, on the other hand, sees no reason why any one concerned should not be present.

After listening, at great length, to reasons advanced to show that the fixing of price is as close an interpretation as can be made of the balance existing between supply and demand, I inquired if I could attend one of their meetings so as to be able to visualize the process. Mr. White's immediate reaction was that it should not be done. When I asked for a reason why the representative of the leading metal-mining paper in the world, a paper much concerned with the silver situation, and bearing as I did credentials from the American Departments of State and Commerce, and from the Senate Committee of Gold and Silver Inquiry, could not be admitted, he weakened to the extent of suggesting that I might make formal application to be allowed to attend. This I did through Mr. Baggallay because I had sensed that he sympathized with my request.

At the meeting on the following day, Mr. Baggallay laid my request before his colleagues. They not only declined to admit me, but I have reason to think, regarded my request as rather presumptuous. I feel very sure that this was in spite of a very earnest plea on my behalf by Mr. Baggallay. I was much impressed with Mr. Baggallay's grasp of the silver situation and by his genuine desire to remove from the price-fixing transaction any suspicion arising from what he evidently regards as unnecessary resort to secrecy. Mr. White is inclined to be cynical and to have little patience with what he terms efforts on the part of producers to interfere with economic law. He knows silver, however, and lacks nothing in intellectual keenness. Incidentally, he has a sense of humor.

The action of the four brokers in denying me access to their meeting was taken after I had explained that most of the producers of silver in America are suspicious of secret price-fixing under any conditions, but when that operation is conducted in a country whose interests are best served by cheap silver, the suspicion is all the stronger. I also set forth the prevalent feeling among miners of the white metal that they should take more interest in their own product after it has left their hands, and that they are now taking very definite action to that end. I went so far as to explain that, accustomed as we are in the United States to the conduct of business transactions in the open, to refuse me admission to one of the price-fixing conferences might carry with it unwarranted deductions. Realizing that this account of my reception would be read by practically every silver producer in the Western Hemisphere, I called attention to that fact. I believe that point was weighed by the brokers before deciding to decline my request. It is my opinion that the brokers, other than Mr. Baggallay, are quite indifferent as to what opinions the American producers may hold as to their conduct of the price-fixing operation.

I was unable to secure any evidence of "manipulation" in their price-fixing procedure. It is the firmly held opinion of Walter S. Tower, the American commercial attaché, who investigated the matter recently at the special request of Secretary Hoover, that the procedure permits of no control or manipulation. That opinion is shared by such an outstanding mining man as R. Gilman Brown, the American who has been honored so signally by being chosen president of the British Institute of Mining and Metallurgy. It is my opinion, however, that the efforts of the silver producers to better their position are regarded with a certain amount of contempt by the brokers who exercise the important price-fixing function; and

judging from the information that I was able to gather, it would seem that the producers should insist at the earliest moment in being represented at the daily price-fixing conference. The good faith of the brokers can be judged best by the reception they give to a concrete proposal from the producers to send a representative to sit with them at their daily conference.

Coal Commission Members Laud Chairman Hammond

"Failure Can in No Wise Be Attributed" to Their Leader, Say Commissioners

Before the adjourning of their final session, the members of the United States Coal Commission paid tribute to John Hays Hammond, their chairman, as follows:

"If the records of the United States Coal Commission shall be preserved in permanent form, the members thereof will not be content with the record unless there remains the statement that if it has failed in accomplishing its purpose, such failure in no wise can be attributed to its chairman, the Hon. John Hays Hammond; and if it has succeeded, a large measure of that success is justly due to the wisdom, prudence, and foresight with which the chairman has presided over its deliberations and guided its investigations.

"There are two grades of presiding officers: one who leaves the impression upon the members of the body that cool, calm, calculating and deliberative justice has been the measure of his service; the other an impression that, back of the conscientious discharge of duty, there has pulsed the warm and unfailing heart of friendship—a friendship which has touched the dead body of duty and brought to its cheek life and the flush of pleasure. To this latter class our chairman belongs. We part from the attempt to discharge our duty with pleasure that the work is over; we grasp his hand in farewell with regret. Long may he live to be an honor to his country and a delight to his friends."

Austrian Interests Want Lower Magnesite Tariffs

At the request of the Austro-American Magnesite Co., the Tariff Commission has postponed until Dec. 5 the public hearing into costs of production of crude magnesite, caustic calcined magnesite, dead-burned, and grain magnesite not suitable for manufacture into oxychloride cements and magnesite brick. In the original order the hearing was fixed for Oct. 1.

The Austro-American Magnesite Co., a selling organization, and three Austrian corporations which produce magnesite in various forms, joined in an application to the Tariff Commission for a reduction in duties on these related commodities under the terms of the flexible tariff sections. The matter will be considered in December.

Electrothermic Smelting of Zinc Ores Offers Many Advantages

Bureau of Mines Engineers Work on Problems—Limitations of Alternative Processes

Progress in the development of improved methods of electrothermic smelting of zinc ores is announced by B. M. O'Harra, of the U. S. Bureau of Mines, in Bulletin 208. Zinc smelting is frequently termed a backward art. The term is hardly true, for great progress has been made in recent years in the design and in the thermal efficiency of the retort furnace, in the quality of retorts, in the recovery of zinc, and in the ability to treat more impure and complex ores, says the report. The fact remains, however, that the peculiar physical and chemical properties of zinc have delayed such immense advances — large smelting units, high recovery, low unit costs, and ability to treat low-grade ores—as have been made in the metallurgy of lead and copper.

Much work has been done in an effort to find cheaper and more efficient methods of recovering zinc from its ores. Various methods have been proposed for smelting in the blast furnace. Some of these contemplated the production of zinc vapor and its condensation to liquid; others attempted to produce liquid zinc directly by smelting under pressure. It is now realized that fundamental difficulties render these proposals impracticable.

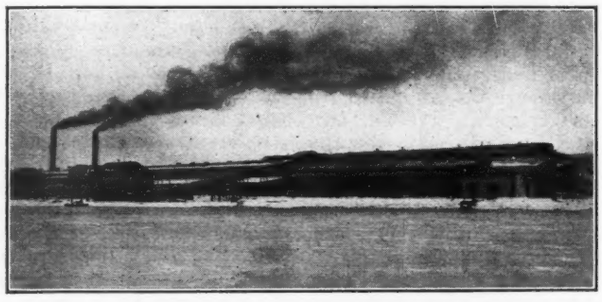
The electric furnace for smelting offers obvious advantages in the way of the efficient utilization of energy, large units, easy attainment of high temperatures, and the possibility of treating complex ores.

E. H. and A. H. Cowles first suggested a design for an electric furnace for the reduction of zinc ores in 1885. In 1900 several investigators started work upon various processes and had more or less success. The chief difficulty they encountered was the impossibility of obtaining more than a small amount of the zinc as liquid metal, because most of the zinc vapor condensed as blue powder. Interest in the electrothermic metallurgy of zinc increased, until in 1914 and 1915 the problem seemed to be approaching solution. About this time the hydrometallurgy of zinc sprang into the limelight and a commercial process was soon perfected. This rapid development, perhaps aided by the war premium on the high-grade spelter produced by electrolytic deposition, distracted attention from electric smelting to some extent, though progress continued.

With the perfection and standardization of the electrolytic process has come a better realization of its limitations, especially the necessity for large-scale operation and the difficulty of obtaining high extraction. Because of these limitations the electrothermic metallurgy of zinc still has a field of its own, and in fact promises to become a strong competitor of both hydrometallurgy and retort smelting except under conditions highly favorable to the latter methods. Because of the imperfections of the retort and electrolytic processes the electric furnace offers an alternative treatment.

War Minerals Business Suffers From Vacationing

Owing to the absence of the Secretary of the Interior, followed by the absence of the department's solicitor, a considerable number of War Minerals Relief opinions are awaiting action by those officials. The Secretary, however, has signed decisions as follows: C. J. Crawford, manganese, $12,710.42; J. T. O'Connor, pyrites, $671.50; S. E. Langford, tungsten, $6,388.10; J. T. Duncan, tungsten, $7,973.05; Mook, Boech, Grayson & Priest, pyrites, further government responsibility not established; R. H. Lake, chrome, no further awards; Fred Raab, chrome, stimulation not established; Henry and August Herman, chrome, no further award; Robert B. McClellan, manganese, not within the act; Sherman Costello, chrome, stimulation not established; Manganese Mining & Development Co., manganese, not within the act; Orren Osborne, tungsten, no further award; John G. Clarke, tungsten, net loss not established; Tungsten Mountain Mines Co., tungsten, commercial importance not established.



The reclamation plant in Michigan from which Calumet & Hecla gets the cheap copper that keeps its average cost down

News from Mining Districts

By Special Correspondents in the Field

London Letter

New State Areas Plant Not a Success —Rhodesia Broken Hill Will Develop Water Power

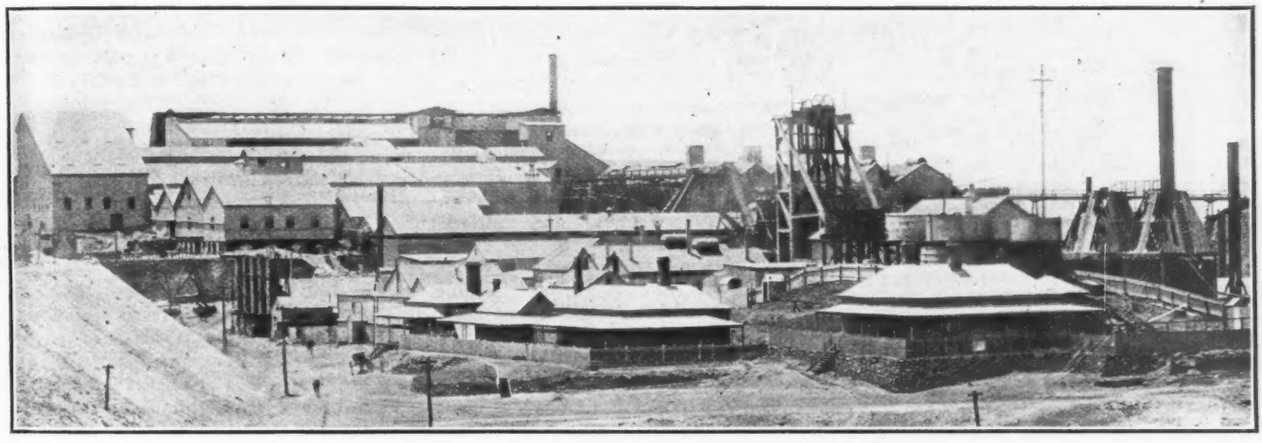
BY W. A. DOMAN

London, Sept. 13—Much disappointment is felt at the unfavorable results of the New State Areas (Eastern Rand). During May and June 32,000 tons was crushed and 1,768 oz. of gold was recovered. For the purpose of tuning up the new plant only low-grade ore was milled. It was then said that the plant was getting into order, and the position was steadily improving. During July, 30,170 tons was crushed and 4,539 oz. of gold recovered. The plant continued to absorb gold, but was said to be in good condition. Last month 40,500 tons was milled, but a loss of £7,301 was sustained. It is pointed out that the results for the month were not up to expectation, but a better showing is anticipated for the current month. The plant is the all-sliming process, and so far does not appear to be a success. It was first adopted at the Brakpan, and subsequently at the Springs Mines, and on these two properties it is working quite successfully.

The Rhodesia Broken Hill is putting in hand a big scheme for the development of water-power for the treatment plant. The idea is to harness the Mulungushi River at a point about 34 miles from the company's property. A large dam is to be built across a gorge, and a tunnel about 700 ft. long by 15 ft. by 12 ft. is being driven to regulate the flow of water. The fall is about 1,200 ft., and it is estimated that about 10,000 hp. can be generated. It is expected that the plant will be in operation about eighteen months hence.

A new company has been formed here called the Amalgamated Smelters, with a nominal capital of £80,000 in 60,000 6 per cent cumulative preference shares of £1 each, and 400,000 ordinary shares of 1s. each. The intention is to acquire shares in the London Smelting Co. and the Penpoll Tin Smelting Co., and to carry on the business of smelting, manufacturing and dealing in tin, steel, copper, lead, bronze, nickel, aluminum, and other metals. The principal parties interested are Sir Edwin A. Speed, A. Strauss & Co., and F. Lee.

Shareholders in San Francisco Mines, of Mexico, have been heartened both by the publication of the August return and by the receipt of a cable dispatch announcing that the new plant has started. The original capacity of the plant was 250 tons daily. It has now been doubled, and the mine manager expects it to run at an average of 400 tons daily until December, when presumably it will be tuned up to the full 500 tons. For some months the average treated has been under 250 tons, due to the linking up of the plant. The company should benefit from the price of spelter, which has risen nearly £3 a ton in anticipation of demands from the Far East.



Lake View Consols mill, on the Rand, in South Africa

Melbourne Letter

Commemorate Discovery of Gold—Perkins Process To Be Used at Pilbara —Consolidation at Broken Hill

BY PETER G. TAIT

Melbourne, Aug. 20 — Suitably to mark the site of the first discovery of payable gold in Australia, the New South Wales Department of Mines proposes to erect an obelisk at Ophir, near Orange, N.S.W., bearing the following inscription: "This obelisk was erected by the New South Wales government to commemorate the first discovery of payable gold in Australia, which was found in the creek in front of this monument. Those responsible for the discovery were: Edward Hammond Hargreaves, John Hardman Australia Lister, James Tom, William Tom. From experience gained in California, Hargreaves formed the idea that the district was auriferous and he found the first gold on the twelfth of February, 1851, about two miles up Lewis Ponds Creek. He explained to the others how to prospect and make and use a miners' cradle, and Lister and W. Tom found payable gold between the seventh and tenth of April, 1851."

News has come to hand from London that the Pilbara Copper Field, Ltd., owner of the Whim Creek copper mine in Western Australia, will install the Perkins process, which is controlled by the Mineral Separation, Ltd., of London. The first unit to be erected will have a capacity of 200 tons per day. The cost of producing on this basis is estimated at £40 13s. 4d. per ton. The company has considerable ore reserves stated to average 5 per cent copper and a large tonnage near the surface. A Murex magnetic plant was installed some years ago, but recently the plants have been idle pending a decision as to the future method of treatment and provision of the necessary capital.

The British Australian Broken Hill Co., which it will be remembered was formed to remove the control of the British Broken Hill company from London to Australia, is again attracting attention. The present proposal is to amalgamate with the North Broken Hill Co., whose workings adjoin. It will be an easy matter to convey ore from the British mine to the North company's mill, which is up to date in every respect. In this way by handling larger tonnages milling and overhead costs will be reduced. The arrangement cannot be concluded until it is approved by the shareholders of the respective companies. As amalgamation is in the air, it would not be a matter for surprise if the Junction, Junction North, or Block 14 came to an understanding with some of their neighbors.

Johannesburg Letter

Decline in Number of Portuguese "Boys" Hurts Rand—Gold Shipments Will Go Direct to India

By John Watson

Johannesburg, Aug. 21—At the meeting of the Native Recruiting Corporation, Ltd., held at the Chamber of Mines on Aug. 13, C. W. Villiers presided for the last time, after twelve years in office. He retires at the end of this month. On June 30, 1923, there were employed underground 54,310 Portuguese and 81,970 British South African natives, while on June 30, 1922, the numbers were 62,302 Portuguese and 76,563 British. The reduction of nearly 8,000 Portuguese "boys" is entirely due to the restriction placed on the recruiting of Portuguese natives by the Union Government. Had this restriction been relaxed earlier in the year, the present native labor shortage on the gold mines might have been avoided. The British natives are having excellent crops in their territories, which keeps them at home; also, the diamond industry is now taking more than three times the number of natives it did a year ago. Most of these natives are from Basutoland. It is hoped that the supply of natives to the gold mines will be adequate during the next few months. Arthur French, on behalf of the board of management, paid a tribute to the excellent work of the chairman and wished him the best of success in his further career.

Facilities are now provided for the direct shipment of South African gold to its ultimate destination. India takes on an average about 3,000,000 oz. per annum. The first consignment to be shipped direct from Durban to India will leave this week and amounts to 5,000 oz. The settlement of the sale accounts will still be in London.

The reports for the quarter ended June 30 of the South African Townships and Mining Corporation, Ltd., show that the Rezende Gold mine, near Umtali, earned a total profit of £18,276; West End Diamonds yielded 5,430 metric carats of diamonds having a value of £15,272, giving an estimated profit of £1,784; Leeuwpoort Tin recovered 141.5 tons of concentrates; McCreedy Tins (Swaziland) recovered 16.8 tons of concentrates and South African Alkali was producing about 4½ tons of soda ash daily at end of June. The last-named company also proposes to begin the sale of salt as soon as its plant is completed.

AFRICA

Gold Discoveries in Tanganyika Region

Though definite information regarding the value of reported gold discoveries in the Tanganyika Territory, in Africa, is lacking, great physical difficulties would have to be overcome in developing a field in this region, according to William L. Jenkins, American Consul at Nairobi, Colony of Kenya.

"At the end of June, 1923, an unconfirmed rumor was received that gold had been discovered in the southern part of Tanganyika Territory and that a gold rush was in progress," reads the report. "An answer just received from Dar-es-Salaam, in regard to inquiries respecting this rumor, reveals the fact that there has been considerable local excitement there as a result of the rumored new discovery of gold near Tukuyu, on the southeastern shores of Lake Tanganyika, among the Livingstone Mountains.

"Numerous applications for prospecting licenses in that region are being made by responsible settlers and officials alike. Some of the latter are resigning from their positions to join the rush.

"The latest advices, however, indicate that the gold so far found is only alluvial, although this indicates the presence of a reef higher up. Even should this be discovered, the difficulties incident to transporting machinery, stores, and the metal itself to the lake, thence to Kigoma, the terminus of the Central Railway of Tanganyika, and thence to the port of Dar-es-Salaam will be great.

"It will not be at all surprising if gold be discovered in considerable quantities in the Lake Tanganyika region," the report continues. "Several claims in the Mwanza and Musoma districts indicate its existence there. The Kilamafeza gold mine, near Ikoma, has already produced gold, and will undoubtedly resume operations. It was recently put up for sale and bought in by one of the former owners at the absurdly low price of £1,750. Mining machinery has been installed on a claim owned by Sir Northrup MacMillan near Gori, Kenya Colony, near the Tanganyika border."

ONTARIO

Two Tons of 10,000-Oz. Ore

A section of the big No. 26 vein at the Keeley mine, in South Lorrain, has been purchased by the Ontario Department of Mines. The piece weighs about two tons, and is estimated to contain 20,000 ounces of silver, and is the most valuable piece of ore owned by the government. The Keeley's financial statement shows that the current assets, consisting of cash, bonds and ore, amounts to $711,000.

Dividends From Cobalt and Kirkland

The Kerr Lake Company, Cobalt, has declared the regular quarterly dividend of 12½c. a share, payable Oct. 15 to shareholders of record Oct. 1. The Nipissing has declared the regular quarterly dividend of 3 per cent, together with an extra bonus of 3 per cent, payable Oct. 20 to shareholders of record Oct. 1. The current surplus amounts to over $4,500,000. The Wright-Hargreaves has declared a dividend of 2½ per cent, payable Oct. 1 to shareholders of record Sept. 15. This dividend, which calls for $68,750, is at the rate of 10 per cent for the year, and brings total dividend disbursements up to $687,500.

MEXICO

National Chamber of Mines Organized

The organization of the much-talked-of National Chamber of Mining of Mexico has been effected. At a meeting held on Sept. 11, copies of the proposed bylaws were distributed among the charter members for revision and presented with some corrections at a second meeting held in the Cook Building at Mexico City on Sept. 14.

Among those who attended the meetings were Norberto Dominguez, representing the general mining interest of Mexico; Genaro P. Garcia, representing the Compañia Real del Monte y Pachuca, Compañia Minera Santa Ana y Anexas, and the Compañia Minera de Atotonilco el Chico; Manuel Escalante and Jose Luis Cuevas, representing the Compañia Minera El Encino y Anexas; Adolfo Prieto, president of the Compañia Fundidora de Fierro y Acero de Monterrey; B. J. Silbert, representing the Compañia Santa Gertrudis and The Mexican Corporation; Federico MacCoy, director of the Negociacion Minera de San Rafael y Anexas; Eusebio Gomez Allende, representing the Negociacion Minera Santa Maria de la Paz; Adolfo Martinez, representing the American Smelting & Refining Co., and Senor Robles, representing the Compañia General de Inversiones Mineras.

L. E. Botello Relocates Properties in Zacatecas

The old Pabellon Mexicano and San Rafael mines, in the Caballos Mountains of the Mezquital del Oro district of Zacatecas, abandoned by former owners, have been relocated by Luis E. Botello, who is associated with Generals Vidal Silva, Leoviguil de Avila and Maurilio Mejia and various private citizens of Mexico City. The properties produce both gold and silver, and when operated by former proprietors are said to have been profitable. Some of the old shafts are down over 150 ft. and contain good ore. The Union de Oro workings on these properties have produced considerable high-grade ore. According to Alberto Tamborrel, who is making a resurvey of the claims, the probabilities are that they will develop into producers.

Nazareno Operations Reorganized

Gonzalez Sandoval, connected with the Nazareno Mining Co., has recently returned from a visit to the properties at Temascaltepec. Operations are being reorganized, and the mines, now in bad condition, are being put in condition for ore extraction.

At the present time about 110 men are employed and more than thirty tons of ore is being mined each week. The average assay of this product is given as 35 oz. silver and 16 gm. of gold to the ton; it is extracted at a cost of about 26 pesos. The ores are treated at the Presa de Quebradillas reduction works, which saves about 90 per cent of the silver and 93 of the gold.

OREGON

Better Outlook Around Baker

The Baisley Elkhorn mine, 12 miles from Baker, and the Lone Star, at Mineral, are shipping ore to the Sumpter Valley smelter at Sumpter. The Amalgamated Mines Co., in the Cornucopia district, has resumed operations and will start the mill this fall on some high-grade gold ore opened recently in the Murray vein. The district surrounding Baker is gradually resuming normal mining activity after several years of inactivity.

NEVADA

Prince To Be Worked Below Water Level

News of the reopening of the Prince Consolidated mine has made a better feeling in Pioche. The property has been one of best producers in the past, having shipped approximately 1,000,000 tons of ore to the Salt Lake smelters in the last ten years. Insufficient finance has made the working of the mine below water level difficult, and the property has been closed down for six months. Under the new plan the present stockholders will provide the funds necessary to equip the mine with pumping machinery and leave a substantial sum in the treasury.

CALIFORNIA

San Francisco Correspondence

Dredging Ground Grows Scarce

The Paulsen ranch, near Lewiston, Trinity County, has been acquired by L. Gardella, who is operating a gold dredge on the Trinity River opposite the ranch in question. The new area will be dredged. Parts of the near-by property along the river above the Paulsen ranch have been ground-sluiced, and placer operations generally have been carried on for several years. Gold dredging ground has become exceedingly scarce in California of late years and this property represents one of the few areas remaining. The Shasta Gold Dredging Co. has worked out its holdings in Shasta County near Gas Point, and will either discontinue or endeavor to acquire new ground. A noteworthy feature of the company's dredging operations was the recovery of a relatively high proportion of platinum.

Higgins, et al, Get Erstwhile Metals Exploration Property

Articles of incorporation have been filed by the Fremont-Gover Mines Co. at Jackson. The capital stock is $250,000. The directors of the new company are Edwin Higgins, R. H. Elliott, S. A. Holman, E. E. Check, and W. E. Colby. The property at Sutter Creek is on the Mother Lode, and was formerly worked extensively. It was unwatered and rehabilitated by the Metals Exploration Co. under a bond. On the reorganization of this company the Fremont and Gover mines were acquired by Edwin Higgins and his associates.

Ahmeek, in Michigan, Up to War-time Copper Output

IN SPITE of labor shortage throughout the Michigan copper district, Ahmeek, with an underground force considerably smaller than in normal times, is almost at peak production in refined copper. Metal output is now in excess of 2,000,000 lb. per month, which is equal to production in 1918 and better than anything since.

The mine made the best record in August since it was reopened on April 1, 1922, upward of 60,000 tons of copper rock being sent to the mill. Daily tonnage is now at the average rate of 2,500 tons. Ahmeek yield continues remarkably high, the rock running better than 30 lb. to the ton in refined copper return. Operations are confined to Nos. 2 and 4 shafts, No. 2 being the chief producer.

UTAH

Columbia Steel Corporation Ships First Iron Ore From Iron Springs, Utah

The first car of ore from the property of the Columbia Steel Corporation, at Iron Springs, Utah, was shipped Sept. 25. The company is completing its No. 1 tunnel, which is to be the main outlet for the ore. Shafts are being sunk on the orebody in a number of places, and smaller tunnels are being driven to connect with the main tunnel. After continuous shipments are under way it is expected to store the ore at Ironton (near Provo, Utah), the site of the new blast furnace and coke ovens under construction.

Alta Merger Makes Shipments

The South Hecla mine of the Alta Merger company, at Alta, has shipped the second car of ore from the Sells raise and the No. 4 raise. At the Emma Silver mine, under the same management, the new find on the 700 level continues promising. Ore is being mined in two places on this level, and two raises are being driven 100 ft. apart to open the ore on the levels above. Ore is being developed on the 600 level also.

WASHINGTON

Magnesite Output Increases

The Chewelah plant of the Northwest Magnesite Co. has recently increased its production to a point within 50 per cent of normal. Magnesite mining in Stevens County has not assumed such proportion since the war demands expired. It is rumored that Austrian interests are at work to obtain another hearing before the Congressional committee to reduce, if not remove, the tariff on Austrian magnesite. In the event this were successful the industry in Washington will be unable to operate, according to local officials.

ARIZONA

Ore in Superior & Boston

In the Superior & Boston mine, at Globe, a body of ore has been discovered in a crosscut on the 900 level that is believed to be a continuation of the North, or Old Dominion, vein. The ore is in diabase about 70 ft. north of the disbase-quartzite contact and is 6 ft. wide, containing 3 per cent copper and 16 oz. silver, where exposed in a crosscut. This is believed to be a continuation of the ore recently opened on the 800 level. Crosscutting is under way on the 1,000 level and drifting on the newly opened ore on the 900 level will be rushed as soon as possible.

Hall Claims Taken Over by New Company

The Hall mining claims near Paradise, in the Chiricauhua Mountains, were taken over about six months ago by a group of Ohio people, who placed A. L. New, of Los Angeles, in charge of the development work. Considerable work has been done and arrangements have been made to complete the purchase of the claims. A company to be known as the New-Vail Mining Co. will be organized to take over the project and proceed at once with development work.

COLORADO

Wolf Tongue Ships Tungsten Concentrate

The Wolf Tongue Mining Co., operating in the tungsten districts of Boulder County, in Colorado, on Sept. 1 shipped its sixth carload since the resumption of operations. The shipment consisted of 40 tons of high-grade ore and concentrates, and was worth over $25,000 at the present market. It was consigned to McKeesport, Pa.

Tungsten mining in this district was active during the war, and the value of the annual output more than once exceeded $5,000,000, but with the signing of the armistice and the break in price, the mines all closed down, and mining operations in this section entirely ceased. The increased price which followed the enactment of the Fordney tariff bill made it possible for the Wolf Tongue company to resume operations, and the company entered the market as a purchaser of ore about March 1 of this year. Most of the production is made by leasers, as the larger operators claim that present prices do not justify company operation.

La Luz Willing to Sell

At a recent meeting of the La Luz y Anexas Mining Co. it was decided to sell the mines which are situated in the district of Victoria, State of Guanajuato, Mexico, if terms are obtained. It is understood that negotiations are pending with foreign capitalists who wish to acquire these properties. Some of the ores produced are rich and there is an abundance of ore of low grade.

IDAHO

Hecla Will Resume Mining by End of Year

The Hecla Mining Co., of Wallace, Idaho, whose surface plant was totally destroyed by fire on July 13, expects to be in position to resume production before Jan. 1. Official information to this effect was contained in a letter to the stockholders which accompanied dividend checks distributed on Sept. 15. The company carried fire insurance to the amount of $337,000, all of which has been paid, but which will not be sufficient to erect the plant now under construction. The new plant will be of steel and concrete and as nearly fireproof as possible.

The company also carried a "use and occupancy" insurance policy for $1,000,000, in which a large number of insurance companies participated, but which has not yet been adjusted.

The letter also contains an interesting tabulation of the earnings of the company during the first half of the year, which follows:

Income from all sources	$1,856,799.84
Operating costs	902,367.83
Operating profit	$954,432.01
Depreciation	74,857.27
Net profit	$879,574.74

In the first quarter this year the Hecla company paid a dividend of 50c. per share, amounting to $500,000. In the second quarter the disbursement was 25c. per share and amounted to $250,000. The disbursement for the present quarter was 15c. per share, or $150,000.

According to the company's last annual report, the ore reserves of the mine were estimated at 2,057,777 tons, or sufficient for seven years at the present rate of production. The mine is operated through a vertical shaft 2,000 ft. deep, and at the time the fire forced a suspension sinking was well advanced from the 2,000 level, the purpose being to sink 400 ft. and crosscut to the vein. This work is expected to make a tremendous addition to the known resources of the mine.

In addition to the operations in the Hecla mine proper, the company, in conjunction with the Bunker Hill & Sullivan, is driving a crosscut from the 2.000 level to the Star vein, a distance of almost two miles. This crosscut would have been completed in October had it not been for the delay caused by the fire, and it is understood that the work will be taken up as soon as the Hecla plant is in operation.

Water-Power Plant for Silverado

Completion of 2,680 ft. of flume, furnishing a 220-ft. head of water for power purposes, marks the initial step in the development of the Silverado property, now under control of the Lincoln Mining Co. in the Coeur d'Alene. The completion of this project will furnish ample power to drive a three-drill air compressor. A Pelton water wheel will be installed with other equipment now on the ground for the power plant

JOPLIN-MIAMI DISTRICT

Lucky Jew's Success Draws Others

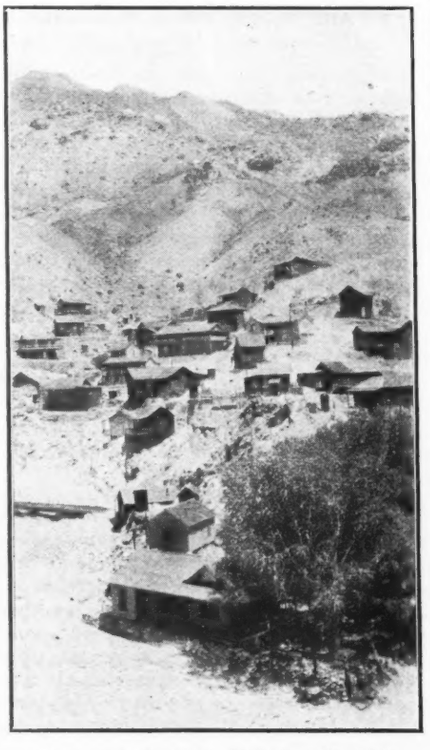
The Lucky Jew mine, situated on the extreme northwestern edge of the developed area in the Oklahoma-Kansas section of the field, has recently opened a fine run of ore at a depth of 360 ft., the deepest yet mined in that section. Drilling has been carried on over a considerable area, and the company officers state they have the deep rich run blocked out for more than a half mile on their lease. Their success at the lower level is encouraging other companies with leases in this neighborhood and five new shafts are going down immediately south of the Lucky Jew.

Baxter Springs Busy Place

Considerable activity is being shown in the vicinity of Baxter Springs, Kan. The Chanute Spelter Co. is hurrying work on its new field shaft at the Brewster and is expected to resume operations at the Ebbenstein mill about Oct. 1. The Admiralty Zinc Co. has contracted for a new shaft just to the northeast of the Brewster on acreage it recently obtained.

Kansouri Ready to Start

The Federal Mining & Smelting Co. is planning to start mining at its Kansouri lease about Oct. 1. Since deciding to take over this lease, upon which it had a drilling option, the company has been busy sinking a new field shaft to the 270 level. Air drifts are now being completed. The company has put down about 100 holes since taking option on the lease. The ore will be transported to the large concentrator on a neighboring tract for treatment. A force is being collected.



Copper Mountain, at Metcalf, Ariz.

MICHIGAN

Quincy Increases Its Complement of Miners

The large furnace in the Quincy smelting plant has been undergoing repairs for the last three weeks, and one of the small furnaces is being used. Refined copper production is 900,000 to 1,000,000 lb. per month. Quincy is still short handed, but a small net gain in man power is now being made each month, sufficient labor coming in from other districts to more than fill such vacancies as occur from time to time. No. 2 shaft is the chief producer, a splendid grade of stamp rock coming from the deepest levels as well as a large tonnage of heavy mass copper.

Mohawk Will Sink to 22d Level

The recent unusual flow of water in No. 5 shaft, Mohawk, has been controlled and the shaft drained below the 20th level. Sinking will now be carried to the 22d level, a depth of 250 ft. Values at depth are consistent, the yield averaging about 23 lb. of refined copper per ton. A 600-gal. power pump will be installed in this shaft this fall, which will be ample to handle almost any excess of water. Mohawk's tonnage is still approximately 1,700 tons daily. There is little change in the labor situation at the mine; the underground force is smaller than required, but has been maintained without further net loss, regardless of the usual summer losses of men to the farms.

Seneca Should Produce This Month

Work both underground and on surface at Seneca is being prosecuted with vigor, and the property will be ready to begin production within the current month, it is expected. All openings are in good commercial ground, with the best showing in the bottom levels. The 7th level in Seneca shaft, the deepest opening, is heavily charged with barrel work and stamp copper for its entire length of 1,347 ft. These values at depth, comparing with the richest openings in Ahmeek and Mohawk, neighboring properties on the Kearsarge lode, are considered a most encouraging feature of developments to date.

WISCONSIN

Montreal Mining Co. Plans Ten Model New Houses

The Montreal Mining Co., subsidiary of Oglebay, Norton & Co., has let a contract to Tomlinson & Egan, of Ashland, Wis., to build seven six-room and three double houses of eight rooms each at its mining property in Hamilton, Wis. The houses are to be completed this year, and are to be similar to some of the seventy-four houses recently completed by another Oglebay, Norton subsidiary at Ramsay, Mich. They are of modern designs and complete in detail, with basement, furnace, bath, lights, water, and sewer. They are to be built in a site where mining operations have not destroyed the natural beauty of the woods.

THE MARKET REPORT

Daily Prices of Metals

Sept.	Copper, N. Y. net refinery*	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
20	13.125	40.75	41.25	6.875	6.70	6.40
21	13.125@13.25	40.625	41.125	6.875	6.70	6.40
22	13.125@13.25	40.75	41.25	6.875	6.70	6.40
24	13.25	41.625	42.125	6.875	6.70	6.40
25	13.25	41.875	42.375	6.875	6.70	6.40
26	13.25	41.125	41.625	6.875	6.70	6.40
Av.	13.208	41.125	41.625	6.875	6.70	6.40

*These prices correspond to the following quotations for copper delivered: Sept. 20th, 13.375c.; 21st and 22d, 13.375@13.50c.; 24th, 25th and 26th, 13.50c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

The quotations are arrived at by a committee consisting of the market editors of *Engineering and Mining Journal-Press* and a special representative of the Bureau of Mines and the Bureau of Foreign and Domestic Commerce.

London

Sept.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3M		Spot	3M	Spot	3M	Spot	3M
20	62 3/8	63	67 1/2	198	198 1/4	25 1/2	25 1/8	33 1/4	32 5/8
21	63	63 1/2	67 3/4	197 1/2	197 1/4	25 1/2	25 1/8	33 1/2	32 3/4
24	63 1/8	63 5/8	67 3/4	202 1/2	200 7/8	25 5/8	25 3/8	33 5/8	33 1/8
25	63 3/4	64 1/8	68	203 1/4	202 7/8	25 3/4	25 1/2	33 7/8	32 7/8
26	63 1/4	63 5/8	67 1/2	200 1/4	200 1/4	26	25 3/4	33 7/8	32 3/4

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

Sept.	Sterling Exchange "Checks"	Silver		Gold London	Sept.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
20	4.54	65 1/4	32 5/16	90s 8d	24	4.55 5/8	65 1/4	32 1/16	90s 5d
21	4.53 7/8	65 1/8	32 3/8	90s 8d	25	4.56	65 1/4	32 1/16	90s 2d
22	4.55	65 3/8	32 5/16	.....	26	4.55 1/4	64 7/8	31 7/8	90s 4d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command one-quarter of a cent premium.

Metal Markets

New York, Sept. 26, 1923

Little change has occurred in metal prices during the last week and buying has in general been only moderate. Copper has recovered from the low point of 13.25c. reached last Wednesday and seems, temporarily at least, on the up-grade.

Corrections—The price of silver on Sept. 8 was incorrectly given in the Sept. 15 issue as 31⅞d. The correct figure is 31 7/16d., London.

In the table entitled "Daily Prices of Metals" in the Sept. 22 issue, some copies were issued in which incorrect dates were given. The last three days for which prices were quoted were obviously Sept. 17, 18, and 19, and not 16, 17, and 18.

Copper

Copper producers are in better spirits than for some time. The metal that was sold for 13.25c., delivered, last Wednesday, practically cleaned up the market, and on Thursday 13⅜c. was about the best that could be done. Some producers continued all the time at the 13.50c. level, and business at that figure began to be placed on Friday. By Monday all the 13⅜c. copper had been cleaned up, and since then practically all domestic sales have been at 13.50c. Several producers are holding at 13⅝c., but so far as we have heard, business at that level has been insignificant. These prices hold for deliveries over the balance of the year; for the first quarter of 1924, the market has been one-quarter cent higher, but sales for such advanced delivery have been unimportant.

The better feeling in the copper market has been brought about both by improved domestic business and continued good sales abroad, to France particularly. Shipments to Europe in August were the best for a long time and the clearing up of the Ruhr difficulty, which seems to be on the way, should improve conditions further. Copper fabricators in the United States report that orders have improved in the last week or two, and if this condition continues, they will of course need more copper. Some of them have had to reduce production materially recently owing to a lull in the demand for finished products. Their copper metal inventories have in general been cut to the bone, so that any improvement in their business should have an almost immediate effect in the copper market.

Lead

The official contract price of the American Smelting & Refining Co. continues at 6.85c. per lb., New York.

The lead market has been quiet this last week, but the undertone is decidedly firm. Though our quotations do not reflect so high an average price having been received as last week, for New York deliveries, this is merely because less prompt metal at premium prices was sold; the quoted prices are certainly no lower and for delivery before the end of October, anywhere from 6.90 to 7⅛c. would have to be paid. Consumers seem now to be pretty well provided with immediate requirements, however, and most of the sales have been made for late October shipment on the Smelting company's price basis.

Occasional sales of modest tonnages have been made for shipment from Middle Western refineries and plenty of lead seems to be available to meet the demand. Offers have been freely made at 6.70c., St. Louis, all week, though one or two sales have been made at 6.725c. In Chicago, lead can be obtained at from 6.725 to 6.75c., though some producers are not anxious sellers and quote higher prices.

Lead consumers report no falling off in business to speak of, and an active fall demand is anticipated. Supplies may be augmented somewhat by the return of labor to the mines and reduction works, labor that has been engaged on the farms during the summer.

Zinc

The slab zinc market has been steady all week at 6.40c. East St. Louis. It has the appearance of expecting to rise, but the impetus required from consumers has not materialized. Sales have been made to Europe in moderate sized tonnages. The statistical record for September will probably show a diminution of stocks in the hands of producers because of the export business. Forward metal is worth a small premium over prompt shipment, 2½ points per month for future delivery. High-grade metal sales have been very good at unchanged prices — 8@8½c. per lb.

Tin

There has been little change in the market. Sales in fair volume were made before the advance on Monday, but since then the market has been exceedingly quiet. Reports at hand indicate that the Straits government has sold about 2,000 tons of its stock. English interests seem to be rather more active than usual and a further advance in prices would not prove surprising. Electrolytic is now practically off the market, as are likewise English 99 per cent grades, prices quoted being largely nominal and for Chinese tin. Forward deliveries of Straits command approximately the same prices as spot.

Arrivals of tin, in long tons: Sept. 12th, Straits, 60; China, 25; 19th, Hamburg, 75; 20th, Straits, 810; Australia, 5; 21st, Liverpool, 10; 24th, Liverpool, 225; total to Sept. 24, 3,230.

Foreign Exchange

Francs have reacted upward because of Germany's reported surrender in the Ruhr, and the highest quotations in some months were recorded. On Tuesday, Sept. 25, cable quotations on francs were 6.255c., and on lire, 4.59c. Canadian dollars, 2 3/32 per cent discount.

Silver

Until Sept. 26 the Indian bazaars continued as good buyers, both in London and New York. China banks, on the other hand, have maintained their position as sellers for prompt and buyers for foward in London, while in New York the inquiry from this quarter has been anything but keen. The tone of the market looks easier at the moment.

Mexican Dollars—Sept. 20th, 49⅞; 21st, 49⅝; 22nd, 49⅞; 24th, 49¾; 25th, 49¾; 26th, 49½.

Other Metals

Quotations cover large wholesale lots unless otherwise specified.

Aluminum—99 per cent grade, 25@27c. per lb.; 98 per cent, 25@26c. London, £115.

Antimony — Chinese and Japanese brands 7⅞c. W.C.C. brand, 8⅛c. Cookson's "C" grade, 10.25@10.50c.

Bismuth—$2.55 per lb. London, 10s.

Cadmium—Prices have declined, domestic producers lowering their quotations to 80@90c. to keep Australian offerings out of the country. London prices are reported to have declined to 3s. 6d.

Cobalt—$3 per lb. for spot.

Iridium—$275@$300 per oz.

Nickel—27@32c. per lb. for 99 per cent virgin metal. London, £125@£130 long ton.

Palladium—$80 per oz.

Platinum—$116 per oz. London, £24 15s.@£25.

Quicksilver—$62 per 75-lb. flask. Quiet. San Francisco wires $61.35. London, £8¾.

The prices of **Magnesium, Molybdenum, Monel Metal, Osmium, Radium, Rhodium, Selenium, Tellurium, Thallium,** and **Tungsten** are unchanged from prices given Sept. 8.

Metallic Ores

Tungsten Ore—High-grade wolframite, $8.75@$9; high-grade scheelite, $9.50@$10 per unit. Ordinary grades, $8.25@$8.50.

Chrome, Iron Ore, Magnetite, Manganese, Molybdenum, Titanium, Vanadium, and **Zircon Ore** are unchanged from the quotations published Sept. 8.

Zinc and Lead Ore Markets

Joplin, Mo., Sept. 22—Zinc blende, per ton, high, $42.85; basis 60 per cent zinc, premium, $40; Prime Western, $40@$39; fines and slimes, no sale; calamine, basis 40 per cent zinc, $20@$22; average settling price, all zinc ore, $41.26.

Lead, high, $87.70; basis 80 per cent lead, $86; average settling price, all lead ore, $84.83 per ton.

Shipments for the week: Blende, 14,997; calamine, 69; lead, 1,647 tons. Value, all ores the week, $763,090.

Premium zinc blende dropped to $40 basis and the general market of Prime Western is $39, one dollar lower, though a few purchases were made on $40 basis. Sellers were loath to accept the lower offerings, and purchases were inconsequential. It is rumored that one company is so short on lead that it is offering to borrow the ore. The borrowing plan is reported to be a guarantee of the present price level or whatever the price level is when the loaner is willing to sell.

Platteville, Wis., Sept. 22—Blende, basis 60 per cent zinc, $42 per ton. Lead, basis 80 per cent lead, $85 per ton. Shipments for the week: Blende, 882 tons; lead, 30 tons. Shipments for the year: Blende, 22,700; lead, 560 tons. Shipments for the week to separating plants, 1,484 tons blende.

Non-Metallic Minerals

Asbestos—Crude No. 1, $375@$500; No. 2, $250@$300; spinning fibers, $150@$200; magnesia and compressed sheet fibers, $90@$135; shingle stock, $50@$65; paper stock, $35@$40; cement stock $20@$25; floats, $8@$15. All f.o.b. mines, per short ton, Quebec.

Barytes, Bauxite, Beryl, Borax, Chalk, China Clay, Diatomaceous Earth, Emery, Feldspar, Fluorspar, Fuller's Earth, Garnet, Graphite, Gypsum, Limestone, Magnesite, Manjak, Mica, Monazite, Phosphate, Pumice, Pyrites, Silica, Sulphur, Talc and Tripoli are unchanged from the Sept. 8 prices.

Mineral Products

Arsenic—Only small quantities have been sold in the last week, but producers have held prices down to 10.50@11c. Offers of 12c. for carloads are reported, however, and the market is strong.

Copper Sulphate—5.10@5.25c. per lb., domestic product.

Sodium Nitrate—$2.45 per 100 lb., ex vessel, Atlantic ports.

Potassium Sulphate and Sodium Sulphate are unchanged from quotations of Sept. 8.

Ferro-Alloys

Ferromanganese—Weaker, 78@82 per cent being freely offered at $110 per gross ton, f.o.b. works. Spiegeleisen, 19@21 per cent, $45; 16@19 per cent, $44.

Ferrosilicon—50 per cent, $85.

Ferrotungsten—88@95c. per lb. of contained W, f.o.b. works.

Ferrocerium, Ferrochrome, Ferromolybdenum, Ferrotitanium, Ferrouranium and **Ferrovanadium** are unchanged from the prices published Sept. 8.

Metal Products

Copper—Sheets, 21¾c. base; wire, 16c.

Nickel Silver—18 per cent Grade A sheets, 28c.

Yellow Metal — Dimension sheets, 19c.; rods, 16c.

Zinc Sheets—Base price, $9.25 per 100 lb., f.o.b. plant.

Lead Sheets—Cut, 10.50c.; full, 10.25c. per lb. Quotation for full and cut sheets should have been reversed last week.

Refractories

Bauxite Brick, Chrome Brick, Firebrick, Magnesite Brick, Magnesite Cement, Silica Brick and **Zirkite** are unchanged from the Sept. 8 prices.

The Iron Trade

Pittsburgh, Sept. 25, 1923

Finished-steel prices are well maintained, and all mills seem convinced that though demand is light it would grow lighter still should price cutting start.

Pig Iron—The market is almost stagnant. Production shows further decreasing tendency. Prices remain steady at $26.50 for bessemer and $25 for basic, foundry and malleable, f.o.b. Valley furnaces, with $1.75 freight to Pittsburgh.

Connellsville Coke—There is hardly any demand, and asking prices continue to decline. Heating coke, $3.75; furnace coke, $4.25; foundry coke, $5.50 @$6.

The Decay of the German Metal Industries

SPECIAL FOREIGN CORRESPONDENCE

The last three months have accelerated the pace of the downward development in the entire field of German metal trades, from mining, refining, and importing to manufacturing of metals. The former rôle of this country as the largest European copper consumer is history. It is impossible to prophesy when the resurrection of the German metal trades will occur.

Nearly all the metal-manufacturing concerns that before June and July of this year enjoyed a profitable export business have now no fresh foreign orders of any importance on hand. The proceeds from this business amount at the present rate only to 20 per cent of the figures reached in May, 1923. The German metal manufacturers are working at an exceptional disadvantage. Not only are wage rates now about 50 per cent higher than in 1913-14 (in terms of gold marks), but also capital is most difficult to obtain. Metal firms have to pay up to 100 per cent a month for money lent against metal advances. The establishment of gold credit accounts by the Central Issuing Bank has rendered the private banks most wary toward borrowers, for they themselves meet with difficulties in rediscounting bills.

Freight charges are also a heavy item, for they are now being calculated on a gold basis. But on the top of all difficulties stand the unobtainable foreign currencies with which obligations toward foreign sellers of metals have to be filled.

In consequence, the requirements of consumers have been reduced to negligible proportions. Copper is now being asked for at the amount of one and a half thousand metric tons a month. That is to say, the consumption of the powerful German industries resembles that of Czechoslovakia and attains only 30 per cent of that of Italy. The technical and financial equipment of the refineries, which hitherto bid fair to become the most efficient in the world other than the American ones, such as the Norddeutsche Affinerie, Zinnhütte Wilhelmsburg, Meyer-Tempelhof, Berzelius and many others, is becoming progressively poor, for they do not even dispose of stocks of fuel and old metals.

The output of cathodes is dwindling so that quotations for them on the Hamburg Metal Exchange are on certain days of the week only nominal, and so it is with standard copper on the Berlin Exchange, where the red metal is now being regarded as a "rare" one. The big electrical companies have started to give notices to their employees, owing to a serious lull in business operations, and brass makers complain of the absence of inquiries by Indian and South American customers. Tin has almost disappeared from the surface, ranging now among "bullion." Tin-plate production in unoccupied Germany has not been adopted on any large scale, and the output of bronze and bearing metals is suffering from the financial plight of the State Railways and municipal transportation undertakings. Owing to the recession of freightage in connection with the poor export business, the shipbuilders' demands for plates cover negligible quantities. The consumption of tin may be put as low as twenty metric tons a month.

Temporary stronger inquiries are principally for transition purposes, for Hamburg is yet an important transfer place for the Austrian succession states and the new border states of Russia.

As for zinc, it is a notable fact that the metal exchanges could not make exact quotations on many days of August, owing to selling on the part of the Zinc Syndicate of Kattowitz exclusively in terms of sterling, while the divergencies of the Berlin "official" (Reichsbank's) exchange rates and foreign ones disturb the usual relations between holders and consumers, since the former have to buy at the world market levels and the latter can only pay according to value of the foreign means of payment. Another difficulty is the "rise" of the Polish mark exchange, which causes differentiations with regard to mutual costs and wages and, therefore, the growing unwillingness of the Polish members to co-operate with the German ones. Zinc production, for the time being, is so small that galvanizers are at a loss where to procure the metal under the circumstances. The formerly lively export of zinc to the United Kingdom has come to an end. On the other hand, Belgian zinc producers have acquired shares of the Holberg Zinc Co., which is the single important zinc ore-mining concern in Germany. It is believed in certain circles that the Belgians are aiming at the full control over the Holberg Co., and with that over the European zinc market, when the plan of making the Rhineland province an autonomous state will have been realized.

The German lead market is most speculative because it is still the only metal which is fit for time bargaining, since future dealings in bullion are prohibited. On the other hand, owing to heavy fluctuations of values and to the so-called flight of the mark, some kind of hedging and covering means is indispensable for the metals. The production of lead hardly exceeds 40,000 metric tons a year, and is far short of requirements, so that the metal has to be imported from Spain, Australia and Mexico. Owing to short-time working, the import is only small.

Aluminum is at present available with the so-called Lautawerke only, and no metal from the Grevenbroich works passes the frontiers of the occupied zone. Instead of exporting the light metal as previous to January of this year, Germany has to import it from the United Kingdom and Switzerland. Here again the exchange obstacle stands in the way. Quotations for prompt aluminum have had to be stopped on several occasions on the exchanges for lack of material.

Business in antimony, ferro-alloys, and nickel is extremely light, because of the curious fact that it is often more profitable to buy hard lead, white metal, and steel plates and steel products abroad than in domestic markets, on account of rising costs.

Gold costs here $700 to $730 per kilogram; that is to say, it is much above the New York parity. This is to be put down to hoarding by the public.

Company Reports

Mount Morgan Gold Mining Co., Ltd.

A report of the operations of the Mount Morgan Gold Mining Co., Ltd., for the year ending May 29, 1923, shows the following results:

The total revenue for the year from all sources amounted to	£675,667	6	1
The expenditure charged to profit-and-loss account, including development and depreciation, has been	745,705	5	9
Showing deficit of	£ 70,037	19	8
Balance brought forward from last account	187,248	0	9
Balance forward to next account	£117,210	1	1

Included in the total revenue from all sources referred to above is the valuation of 1,978 tons of copper on hand at the close of the year, and, as usual, this has been taken at £55 per ton.

The average gross price obtained for electrolytic copper realized was £72 6s. 9d. per ton, compared with £73 11s. per ton for the previous year.

The reserves, insurance and contingent funds, together with the undivided profits, amount to £509,816 4s. 9d.

Unfortunately, a shortage of experienced miners has had an adverse effect throughout the period. Notwithstanding the loss disclosed, the board of directors has decided to continue operations in the hope that an improvement will be manifest during the current period.

During the period covered by the report 266,071 tons of ore was raised.

In the concentrating section 191,727 tons of ore was treated and 72,621 tons of concentrates produced. This resulted in a production of 5,586 tons of fine copper and 63,725 oz. of gold.

The experimental work on re-treatment of tailing has not evolved any process commercially suitable. Arrangements are being made for further experiments during the present year.

Oroville Dredging Co., Ltd.

Gold; Colombia

A report of the operations of the Oroville Dredging Co. for the year ending Sept. 30, 1922, states that the capital has been increased to £740,000 by the creation of 40,000 shares of £1 each. Of this increase 29,029 shares have been issued for the purchase of 102,398 preference shares in the Nechi Mines (Colombia), Ltd., under the terms of the offer made to the shareholders of that company in June last. The total issued capital as on Sept. 30, 1922, is £715,636.

The 125,993 ordinary shares of 10s. each, fully paid, in Nechi Mines (Colombia), Ltd., and 225,000 ordinary shares of Colombian Corporation, Ltd., shown in the last report, are still held, and the total holding in Pato Mines (Colombia), Ltd., has been increased to 89,572 shares of £1 each, fully paid.

During the year under review dividends were received from the company's holding of shares in Nechi Mines (Colombia), Ltd., amounting to £185,892 8s. 3d., and in Pato Mines (Colombia), Ltd., to £62,579 13s., the other credits in the profit-and-loss account amounting to £1,59 10s. 8d. From the total credits of £250,331 11s. 11d., after debiting all charges in London, the balance to credit of profit-and-loss account for the year, carried to the balance sheet, is £194,306 15s. 2d., compared with £144,785 for the previous year. Adding to this amount the credit balance last year, of £50,275 6s., a total is shown of £244,582 1s. 2d. Deducting from this four dividends of 9d. per share on Dec. 30, 1921, March 31, June 24, and Sept. 29, 1922, amounting to £104,-071 17s. 6d., a balance of £140,510 3s. 8d. remained to the credit of profit-and-loss account as at Sept. 30, 1922, subject to excess profits duty (if any) and corporation profits tax.

Pato Company Operations

In his annual report of field operations to Sept. 30, 1922, the general manager of the Pato Company, W. A. Prichard, states that 1,966,287 cu.yd. was dredged, as compared with 1,555,937 for the previous year, the gross value of gold recovered being $479,247, averaging 24.3c. per cu.yd., with an average depth of gravel dredged of 28.1 ft., against $608,511, averaging 39.1c. for the previous year, with an average depth of 33.1 ft. The field cost for the year averaged 9.01c. per cu.yd., compared with 11.33c. for the previous year.

After debiting the amount allocated for depreciation less the Nechi Company's proportion of management and other expenses and rental for use of plant and machinery, dealt with separately in the London accounts, the Pato operating cost amounts to 12.53c. per cu.yd., compared with 15.98c. for the previous year.

The London accounts of the Pato Company for the year show a profit of £66,012 6s., compared with £95,455 18s. 7d. for the previous year, after providing for £26,232 17s. 10d. depreciation. The credit to profit and loss as at Sept. 30, 1922, is £172,702 13s. 5d., subject to excess profits duty (if any) and corporation profits tax, after payment of £70,000 in dividends during the year.

Nechi Company Results

W. A. Prichard, the general manager of the Nechi Company, in his annual report of field operations to Sept. 30, 1922, states that 2,251,336 cu.yd. was dredged from the Nechi Company's ground during the year, compared with 2,628,684 for the previous year, the gross value of the gold recovered being $323,551, averaging 14.4c. per cu.yd., with an average depth of gravel dredged of 40.9 ft., against $653,088, averaging 24.8c., for the previous year, with an average depth of 43.9 ft. The field cost averaged 8.18c. per cu.yd., compared with 6.40c. for the previous year. With the addition of the £1,000 per month rental to Pato Company for the use of its plant, and the proportion of management expenses charged to the Nechi Company's account in the London books, the total operating cost for the financial year to Sept. 30, 1922, amounts to 10.77c. per cu.yd. This cost would be increased to 12.41c. per cu.yd. if depreciation had been written off, compared with 10.03c. for the previous year.

The London accounts of the Nechi Company for the year show a net profit of £37,252 6s. 2d. This, together, with the balance brought forward from last year, less dividends paid during the year 1921-1922, leaves a balance carried forward of £5,889 1s. 2d., subject to excess profits duty (if any) and corporation profit tax, compared with £189,136 15s. at the end of the previous financial year.

Callahan Zinc-Lead Co.

Lead, Zinc; Interstate, Idaho

A report of the operations of the Callahan Zinc-Lead Co. for the second quarter of the year 1923 follows:

Net value of shipments	$282,775.09
Miscellaneous income	20,731.90
Total income	$303,506.99
Production costs, expenses and development	331,878.76
Operating loss	$28,371.77
Improvements and new equipment	14,294.95
Deficit for the period	$42,666.72

The principal features of the mining and milling operations during the quarter were as follows:

Tonnage mined	50,689
Tons of mine ore milled	39,327
Tons of tailings milled	5,700

Average contents of ore milled:	Mine Ore	Tailings
Zinc, per cent	11.30	7.50
Lead, per cent	5.78	....
Silver, oz.	2.14	....

Shipments	Dry Tons	Zinc Assay Per Cent	Zinc, Lb.	Lead Assay Per Cent	Lead, Lb.,
Lead concentrates	2,644	15.25	806,600	56.02	2,962,219
Zinc concentrates	6,972	52.34	7,298,786	4.01	559,316
	9,616		8,105,386		3,521,535

Ounces of silver in lead concentrates	51.11
Mill recovery of zinc, per cent	83.22
Cost of mining, crushing and sorting, per ton mined	$4.017
Cost of milling and flotation royalties, per ton milled	$1.818

Although shipments of zinc and lead-silver concentrates during the second quarter exceeded shipments in the previous period by 640 dry tons, the net value of the increased shipments in the June quarter was only $282,775.09, compared with $347,435.58 in the first quarter of 1923. Declining metal prices during the second quarter were responsible. The average prices obtained during the period were: Zinc, 6.19c. per lb., lead, 7.52c. per lb., and silver 85.29c. per oz.

Total income of $303,506.99 compares with $363,107.96 for the previous quarter. Operating costs were $331,878.76, compared with $309,915.63 in the March quarter. The increased wage scale in effect during the second quarter was mainly responsible for the increase in production costs. A higher wage scale, together with declining metal prices, created a deficit of $42,666.72 for the period, which compares with a surplus of $48,339.30 for the first quarter.

As anticipated in the report for the previous quarter, there has been a material improvement in mill recoveries of zinc during the period just ended. With the return of milder weather, and a more adequate supply of water, mill recovery of zinc increased to 83.22 per cent as against 71.01 per cent during the first quarter. There has, however, been no improvement in the grade of mine ore during the period. This deficiency in the metallic content of mine ore is, therefore, a factor of paramount importance in the profitable operation of the properties, in view of present high operating costs and prevailing low metal prices.

The program for the extensive development of the Callahan and Galena properties has been vigorously prosecuted by the management. The long crosscut on the No. 4 level of the Callahan property has been driven 1,700 ft. The three-compartment shaft at the Galena property has been completed to the 600 level, and the east drift on the No. 6 tunnel level is now in 2,200 ft. The cost of the above development work has been charged to general operating costs, and affects net earnings for the period.

MINING STOCKS

Week Ended September 22, 1923

Stock	Exch.	High	Low	Last		Last Div.
COPPER						
Ahmeek	Boston	...	...	58	June 23, Q	$1.50
Alaska-Br. Col.	N. Y. Curb	*95	*90	*90	...	...
Allouez	Boston	...	...	*16	Mar. '19	1.00
Anaconda	New York	40½	38½	38¾	Se. 15, Oc. 22, Q	0.75
Arcadian Consol.	Boston	1¼	1⅛	1⅛	...	...
Ariz. Com'l	Boston	...	...	9¼	July '23,	0.50
Calaveras	N. Y. Curb	...	...	2	...	...
Calumet & Arizona	Boston	46	45	46	June '23,	1.00
Cal. & Hecla (New)	Boston	20½	20	20	June '23, Q	10.00
Centennial	Boston	...	...	7	Dec. '18, SA	1.00
Cerro de Pasco	New York	40	38½	38½	Jy. 19, Au. 1	1.00
Chile Copper	New York	26½	25⅝	25⅞	Se. 1, Se. 29, Q	0.62½
Chino	New York	16½	15½	15⅝	Sept. '20, Q	0.37½
Con. Cop. Min. (New)	N. Y. Curb	2 1/16	1⅞	2 1/16	...	...
Copper Range	Boston	26⅛	26½	26¼	May '23, Q	1.00
Crystal Copper	Boston Curb	60	58	59	...	...
Davis-Daly	Boston	2⅞	2⅞	2⅞	Mar. '20, Q	0.25
East Butte	Boston	5⅛	5⅛	5⅛	Dec. '19, A	0.50
First National	Boston Curb	40	30	30	Feb. '19, SA	0.15
Franklin	Boston	1⅛	1⅛	1⅛	...	...
Gadsden Copper	Boston Curb	55	35	35	...	...
Granby Consol.	New York	17	16½	16½	May '19, Q	1.25
Greene-Cananea	New York	18	17½	17½	Nov. '20, Q	0.50
Hancock	Boston	...	...	1½	...	...
Howe Sound	N. Y. Curb	3	2⅞	2⅞	Oc. 1, Oc. 15	0.05
Inspiration Consol.	New York	28	26½	26½	Se. 13, Oc. 1 Q	0.50
Iron Cap	Boston Curb	4	4⅛	4	May 23, K	0.15
Isle Royale	Boston	20⅛	19½	19½	Se. 1, Se. 15,	0.50
Kennecott	New York	34	32⅝	33⅛	Se. 7, Oc. 1,	0.75
Keweenaw	Boston	*75	*75	*75	...	...
Lake Copper	Boston	1⅞	1⅛	1⅞	...	...
Magma Copper	New York	29¼	28⅛	29⅛	Jan. '19, Q	0.50
Mason Valley	N. Y. Curb	1⅛	1⅛	1⅛	...	...
Mass Consolidated	Boston	1½	1½	1½	Nov. '17, Q	1.00
Miami Copper	New York	23½	22½	22½	Se. Oc. 1, Q	0.50
Michigan	Boston	2½	1½	2	...	...
Mohawk	Boston	*40	*37¾	*37¾	Se. 22, Oc. 13,	1.00
Mother Lode Coa.	New York	8⅞	8⅜	8½	Je. 8, Je. 30, Q	0.50
Nevada Consol.	New York	12½	12	12½	Sept. '20, Q	0.25
New Cornelia	Boston	17⅛	17	17⅛	Au. 3, Au. 20, Q	0.25
North Butte	Boston	2⅛	2	2	Oct. '18, Q	0.25
Ohio Copper	N. Y. Curb	*67	*60	*63	...	...
Old Dominion	Boston	16½	16¼	16½	Dec. '18, Q	1.00
Osceola	Boston	...	...	31½	June '23, Q	1.00
Phelps Dodge	Open Mar.	†160	†150	...	Se. 20, Oc. 2 Q	1.00
Quincy	Boston	25	24	24½	Mar. '20, Q	1.00
Ray Consolidated	New York	10⅛	9⅞	10¼	Dec. '20, Q	0.25
Ray Hercules	N. Y. Curb	*65	*60	*60	...	...
St. Mary's Min. Ld.	Boston	34	30	31½	Mar. '23, K	3.00
Seneca Copper	New York	8¼	7½	7½	...	...
Shannon	Boston	*50	*45	*45	Nov. '17, Q	0.25
Shattuck Arizona	New York	5¾	5½	5½	Jan. '20, Q	0.25
South Lake	Boston	...	...	*98	...	...
Superior & Boston	Boston	...	...	1⅛	...	...
Tenn. C. & C. cfs.	New York	9¼	9	9⅛	Se. 29, Oc. 15, Q	0.25
Tuolumne	Boston	...	...	1	May '13,	0.10
United Verde Ex.	N. Y. Curb	29⅞	29	29	Oc. 5, No. 1, Q	1.00
Utah Consol.	Boston	...	...	1¾	Sept '18,	0.25
Utah Copper	New York	60½	59⅜	59⅝	Se. 14, Se. 29, Q	1.00
Utah Metal & T.	Boston	*51	*51	*51	Dec. '17,	0.30
Victoria	Boston	*75	*75	*75	...	...
Winona	Boston	*50	*30	*40	...	...
Wolverine	Boston	6½	6	6½	...	...
NICKEL-COPPER						
Internat. Nickel	New York	12⅛	11⅛	12	Mar.' 19,	0.50
Internat. Nickel pfd.	New York	...	...	77⅛	Jy. 19, Au. 1	1.50
LEAD						
Carnegie Lead & Zinc	Pittsburgh	...	...	3½	...	...
National Lead	New York	121½	117¾	118	Se. 16, Se. 29 Q	2.00
National Lead pfd.	New York	112½	112⅛	112⅛	Au. 24, Se. 15 Q	1.75
St. Joseph Lead	New York	20¼	19	20	Se. 9, Se. 20 Q, X	0.50
ZINC						
Am. Z. L. & S.	New York	8	7	7½	May '20,	1.00
Am. Z. L. & S. pfd.	New York	30½	29	29	Nov. '20, Q	1.50
Butte C. & Z.	New York	5½	5⅛	5⅛	Mar. '23,	0.50
Butte & Superior	New York	14⅜	13¾	14⅛	Je. 15, Je. 30, Q	0.50
Callahan Zn-Ld	New York	5⅛	4⅞	4⅞	Dec. '20, Q	0.50
New Jersey Zn.	N. Y. Curb	148	148	148	Jy. 31, Au. 10 Q	2.00
United Zinc	N. Y. Curb	...	...	*50	...	...
Yellow Pine.	Los Angeles	*75	*65	*75	June '23, Q	0.03
SILVER						
Alvarado	N. Y. Curb	...	...	2⅛	...	...
Batopilas Mining	New York	⅛	⅛	⅛	Dec. '07, I	0.12½
Beaver Consol.	Toronto	*34	*31½	*34	May '20, K	0.03
Candelaria	N. Y. Curb	*6	*5	*6	...	...
Castle-Trethewey	Toronto	*31½	*28	*31	...	...
Coniagas	Toronto	2.60	2.50	2.50	May '21, Q	0.12½
Crown Reserve	Toronto	*58½	*56	*58½	Jan. '17,	0.05
Hilltop-Nev.	N. Y. Curb.	*7	*5	*6	...	...
Kerr Lake	N. Y. Curb	2¼	2¼	2¼	Oc. 1, Oc. 15, Q	0.12½
La Rose	Toronto	*28	*26	*26½	Apr. '22,	0.10
McKinley-Dar.-Sav.	Toronto	*18	*15½	*18	Oct. '20, Q	0.03
Mining Corp. Can.	Toronto	3.30	3.10	3.20	Sept. '20, Q	0.12½
Nipissing	N. Y. Curb	5⅛	5⅛	5⅛	Se. 3, Oc. 17. Q	0.30
Ontario Silver	New York	3¼	3¼	3¼	Jan. '19, Q	0.50
Temiskaming	Toronto	*39	*36	*39	Jan. '20, K	0.04

Stock	Exch.	High	Low	Last		Last Div.
GOLD						
Alaska Gold	New York	1/16	1/16	1/16	...	...
Alaska Juneau	New York	⅛	⅛	⅛	...	...
Boundary Red M.	N. Y. Curb	...	...	*12	...	...
Carson Hill	Boston	4¼	4⅛	4¼	...	...
Cresson Consol. G.	N. Y. Curb	3¼	3 1/16	3¼	July '23	2.00
Dome Mines	New York	38½	37¼	38¼	Oc. 12, No. 1, Q	1.75
Golden Cycle	Colo. Springs	1.06½	1.05	1.06½	Dec. '22, Q	0.02
Hollinger Consol.	Toronto	11.60	11.30	11.60	Se. 20, Oc. 8, M	0.05
Homestake Mining	New York	...	...	62	Se. 20, Se. 25 M	0.50
Kirkland Lake	Toronto	*40	*36½	*40	...	...
Lake Shore	Toronto	3.40	3.38	3.40	Au. 1 Au. 15 '23, Q	0.02
McIntyre-Porcupine	New York	17¼	15	17	Au. 1, Se. 1, Q	0.25
Portland	Colo. Springs	...	...	*38½	Oct. '20, Q	0.01
Teck-Hughes	N. Y. Curb	1⅜	1⅜	1⅜	...	...
Tom Reed	Los Angeles	*53	*52	*52	Dec. '19,	0.02
United Eastern	N. Y. Curb	...	...	1 11/16	Jy. '28, Q	0.15
Vipond Cons.	Toronto	*92	*79	*79	...	...
Wright-Hargreaves	Toronto	2.95	2.95	2.95	Se. 15, Oc. 1, Q	0.02½
Yukon Gold	N. Y. Curb	1⅛	1⅛	1⅛	June '18,	0.02½
GOLD AND SILVER						
Boston-Mont. Corp.	N. Y. Curb	*13	*12	*12	...	...
Con. Cortez	N. Y. Curb	*45	*41	*45	...	...
Con. Virginia	San Francisco	10	9⅛	9⅛	...	...
Continental Mines	N. Y. Curb	5⅛	4⅛	4⅛	...	...
Dolores Esperanza	N. Y. Curb	...	...	*85	Jy. 1, Jy. 10 Q	0.05
Jib Consol.	N. Y. Curb	...	...	*65	...	...
Tonopah Belmont	N. Y. Curb	*57	*57	*57	Apr. '23, Q	0.05
Tonopah Divide	N. Y. Curb	*46	*39	*45	May 23	0.10
Tonopah Extension	N. Y. Curb	2⅛	2 1/16	2 1/16	Se. 10, Oc. 1	0.05
Tonopah Mining	N. Y. Curb	...	...	1 1/16	Se. 30, Oc. 1	0.07½
Unity Gold	N. Y. Curb	3⅜	2⅞	3⅜	...	...
West End Consol.	N. Y. Curb	*79	*75	*75	Mar. '23, Q	0.05
SILVER-LEAD						
Bingham Mines	Boston	...	...	16½	Sept. 19, Q	0.25
Cardiff M. & M.	Salt Lake	*83	*67	*69	Dec. '20,	0.15
Chief Consol.	Boston Curb	3⅛	3⅛	3⅛	Au. 1, '23, Q	0.10
Columbus Rexall	Salt Lake	*44	*36½	*37½	Aug. '22,	0.03
Consol. M. & S.	Montreal	27	25½	25½	Oct. '20, Q	0.62½
Erupcion	Boston Curb	2½	2	2	Se. 15, Oc. 2	0.125
Federal M. & S.	New York	...	...	10	Au. 25, Se. 15	1.75
Federal M. & S. pfd.	New York	39	38	39	June '23, Q	1.75
Florence Silver	Spokane	*17½	*16	*17½	Apr. '19, Q, X	0.01½
Hecla Mining	N. Y. Curb	7⅜	7	7⅜	Au. 15, Se. 15	0.15
Iron Blossom Con.	N. Y. Curb	*32	*32	*32	July 16,	0.02½
Marsh Mines	N. Y. Curb	...	...	*7	June '21, I	0.02
Park City	Salt Lake	3.15	3.02½	3.07½	Se. 15, Oc. 1 Q	0.12½
Park Utah	N. Y. Curb	...	...	3	Se. 15, Oc. 1 Q	0.15
Prince Consol.	Salt Lake	*1	*½	*1	Nov. '17,	0.02½
Silversmith	Spokane	*40	*37½	*39	Jy. 2, Jy. 10	0.02
Simon Silver-Lead	N. Y. Curb	...	...	*15	...	...
Snowstorm Silver-L.	N. Y. Curb	...	...	*43	...	...
Tamarack-Custer	Spokane	1.40	1.26	1.40	Je. 30, K	0.02
Tintic Standard	Salt Lake	3.15	3.12½	3.12½	July '23	0.15
Utah-Apex	Boston	3	3	3	June '23, Q, X	0.50
IRON						
Bethlehem Steel	New York	49¾	47	48¾	Se. 1, Oc. 1 Q	1.25
Char. Iron	Detroit	...	...	⅛	...	...
Char. Iron pfd	Detroit	...	...	1½	...	...
Colorado Fuel & Iron	New York	27	25	26½	Au. 10, Au. '25 Q	2.00
Col. Fuel & Iron pfd.	New York	...	...	102	Feb. '23, Q	2.00
Gt. North'n Iron Ore	New York	29¼	26½	27	Apr. '23	1.00
Inland Steel	N. Y. Curb	...	...	46½	Au. 15, Se. 1 '23 Q	0.62½
Mesabi Iron	N. Y. Curb	5½	5	5	...	...
Replogle Steel	New York	11½	10½	11	...	...
Republic I. & S.	New York	44¼	42½	43½	May '21	1.50
Republic I. S. pfd.	New York	87½	87	87	Se. 15, Oc. 1 Q	3.75
Sloss-Sheffield S. & I.	New York	44	43	43½	Se. 2, Oc. 1 Q	1.75
Sloss-Shef. S. & I. pfd.	New York	...	...	78	Je. 22, Jy. 2 Q	1.75
U. S. Steel	New York	89⅛	86⅛	87⅛	Au. 30, Se. 29, Q	1.25
U. S. Steel pfd.	New York	117¼	116⅞	116¾	Au. 7, Au. 30 Q	1.75
Virginia I. C. & C.	New York	...	...	56½	Je. 16, Jy. 2	2.00
Virginia I.C.&C. pfd.	New York	...	...	80	Je. 16, Jy. 2	2.50
VANADIUM						
Vanadium Corp.	New York	30	29	30	Jan. '21, Q	1.00
ASBESTOS						
Asbestos Corp.	Montreal	45½	45	45½	Se. 29, Oc. 15 Q	1.00
Asbestos Corp. pfd.	Montreal	...	...	70	Se. 29, Oc. 15 Q	1.50
SULPHUR						
Freeport Texas	New York	12⅛	11⅛	11⅛	Nov. '19, Q	1.00
Texas Gulf	New York	56	54⅛	56	Se. 1, Se. 15 Q	1.50
PLATINUM						
So. Am. Gold & P.	N. Y. Curb	...	...	2¼	...	...
MINING, SMELTING AND REFINING						
Amer. Metal	New York	44¼	43	43¼	Au. 20, Se. 1	0.75
Amer. Metal pfd.	New York	107⅛	107⅛	107¼	Au. 18, Se 1	1.75
Amer. Sm. & Ref.	New York	...	...	56½	Jy. 9, Au. 1	1.25
Amer. Sm. & Ref. pfd	New York	...	...	96¾	Au. 10, Se. 1 Q	1.75
U. S. Sm. R. & M.	New York	24½	23¾	23½	Jan. '21, Q	0.50
U.S. Sm.R.& M. pfd.	New York	41¾	41	41½	Jy. 6, Jy. 14 Q	0.87½

*Cents per share. †Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I, Initial. X, Includes extra.

Toronto quotations courtesy Arthur E. Moysey; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange; Los Angeles, Chamber of Mines and Oil; Colorado Springs, Colorado Springs Stock Exchange.

NEW MACHINERY AND INVENTIONS

Making Belts Endless—IV

By Louis W. Arny

There are two kinds of cement used for leather belting, the regular belting cement, and the waterproof belting cement, and both can be obtained from the leather belting manufacturer. Both are of ample strength and durability, one being used for dry, and the other for damp or wet conditions.

Regular Cement

The regular cement usually comes in cakes, or lumps, which are dissolved in water, in a double jacketed glue pot. Any pot with a double jacket, that is, having an inner and outer vessel, so that the heat reaches the cement through the medium of hot water, and not directly from the flame, will answer, though it is better to use the safety or underwriter's glue pot, for in it the glue may be maintained under heat directly at the job, and without risk of causing fire.

Make the cement hot, but do not permit it to boil. It should be reduced with hot water to a proper consistency to spread easily, and must be applied "piping" hot, to get the best results. It is desirable, too, that it should be applied fresh, and it is better not to attempt to use over the remains of a previous melting, if it is old and hard. The pot and the brushes must be kept clean, remembering that the base of this cement is animal glue, which is subject to putrefaction.

Waterproof Belting Cement

The waterproof cement is entirely different. It is chemically a base dissolved in a solvent other than water. The solvent is very volatile, and highly inflammable, and it must be kept away from any open light. It reaches the buyer in liquid form, usually ready to spread, though after some spreading the remainder will grow thicker and should be reduced by the addition of solvent, which can be had from the same source as the cement.

This cement is more like a varnish, and is used cold. The surface to be cemented must be thoroughly coated with the cement, well brushed into the fibres of the leather, and then permitted to dry, which, because of the volatility of the solvent, it does rapidly. When dry apply another coat, spreading lightly, permitting this coat to dry in the same manner. Being perfectly dry, it now is ready for the third and last coat.

Be sure to apply evenly, and do not leave any bare spots. On belts wider than 12 in. do not attempt to cover more than a 5-in. cross-section of the belt at one time, since the solvent evaporates very fast, and it is easier to handle a small surface. When applying the last coat, work fast. Do not hammer the joint, but rub it gently, or place it between boards, and apply pressure with the bench screws. The joint should "set" for a couple of hours or longer before the belt is put into operation.

This waterproof cement substantially is liquid celluloid, and its application places a layer of celluloid between the two surfaces of the lap, in which the leather fibres become embedded. It is unaffected by water, in any period of time, because both its base and its solvent are materials which are not soluble in water. It should be used on all belts that are exposed to damp conditions, or on which water or other liquid may leak.

Leather Is Waterproof

Leather itself is waterproof—not in the sense that a good oil-skin coat is waterproof, because it does not permit water to penetrate to the clothing beneath—but the leather is waterproof in the sense that though it will absorb water freely, the water does not injure it, and the leather remains substantially unchanged in any amount of water. Leather belts joined with the waterproof cement above described cannot be injured by water. Belts exposed to flood, or to wet conditions, should be kept well dressed with a good animal grease belt dressing to maintain the lubrication of their fibres, and to prevent it becoming hard when it dries.

Both of these cements are thoroughly practicable for their use in belts, without the addition of any rivets, pegs, stitching, or other means intended to hold the plies of the belt together. Thousands of miles of belting are running every day with no other fastening between their plies than one or the other of these cements. Their efficacy has been abundantly proven by many years of experience, and hence the addition of rivets or stitching not only is unnecessary, but is a positive disadvantage to the belt in that every hole punched for a rivet, or a stitch, is a source of weakness, and reduces the strength of the belt.

Lubrication

The occasion of taking a belt off the pulley for shortening, or for repairs, always presents the opportunity of making a careful examination of it, more particularly to see that it is being properly lubricated. A good leather belt requires no dressing on its grain, or pulley, side to make it adhere to the pulley, for the natural pulley grip of the leather makes an adhesion with the pulley that is quite sufficient to transmit its rated load, but the leather is composed of thousands of little fibres that are constantly working on each other, and which require lubrication in the same manner as other working parts.

It is well to avoid the use of dressings which produce an artificial adhesion between the belt and the pulley, for most of them are injurious, and all of them unnecessary, a suitable lubrication of the fibres of the leather being all that is required.

TRADE CATALOGS

Trucks—The Crescent Truck Co., manufacturers of electric trucks and tractors, of Lebanon, Pa., has issued a catalog describing electric industrial trucks and tractors intended for transporting material about the plant.

Shovels—The Bucyrus Company of South Milwaukee, Wis., has issued Bulletin F 201, describing its new 20B gasoline universal shovel equipped with a ¾-yd. dipper. This shovel has a caterpillar mounting.

Motors—Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has issued Bulletin 1,118 B, describing type AR squirrel-cage, polyphase induction motors. The general construction, the operating characteristics and the control apparatus are covered. The pamphlet has ten pages.

Drills and Sharpeners—The Sullivan Machinery Co. of Chicago has just issued the three following bulletins: 81 B, describing the new line of rotator hammer drills which have been redesigned to secure increasing drilling speed; 72 H, describing drill steel sharpeners; and 77 G, describing the single stage steam-driven air compressor. The last two are reprints of former editions. In describing its new line of rotator drills the company makes a point of the fact that by substituting certain parts the same results in drilling speed may be secured with drills already in the hands of users.

Electric Tools—The Hisey-Wolf Machine Co., Cincinnati, Ohio, has issued a 32-page catalog (No. 3,027) describing its line of electric portable tools for a wide variety of purposes. The catalog has been purposely made compact for use by agents and dealers.

Compressor Filters—Midwest Air Filters, Inc., 100 East 45th St., New York, has prepared a 48-page pamphlet entitled "Dust Problems and Their Solution" which describes methods and apparatus now available for fighting dust in plants. In particular it points out the advantages of compression filters, which are intended to remove the dust from the air entering the compressor, with resultant advantages as to lubrication and upkeep of the machine.

Motors—Bulletin 5,018 of the Reliance Electric & Engineering Co., Cleveland, Ohio, describes a new line of alternating current motors which the company is making.

Blowers—The Connersville Blower Co., of Connersville, Ind., has just issued catalog No. 21, which is a description of some of the details of construction in the Connersville positive pressure blowers and which also contains information concerning a number of specific installations covering a few of the many uses to which this type of blower is applied.